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Play in Children with Motor Disabilities

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PLAY IN CHILDREN WITH MOTOR DISABILITIES

DISSERTATION

A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy in the College of Health Sciences at the University of Kentucky

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ABSTRACT OF DISSERTATION

PLAY IN CHILDREN WITH MOTOR DISABILITIES

The purpose of this research was to explore and describe the relationship among the child, family, home environment, and pretend play of children with motor disabilities. The environment is a powerful force in early child development. This research is based on Bronfennbrenner's ecological theory of development and the ubiquitous role of play in all domains of development. Children with motor disabilities may lack exploration of the environment and as a consequence demonstrate deficits in play. Play was measured in 32 children with motor disabilities aged 24.8 to 61.3 months with a mean age of 33.7 (SD 9.3) months. Children demonstrated mild to moderate motor disabilities based on the Gross Motor Function Classification System. The prevalent motor disabilities were cerebral palsy, genetic disorders, delayed development, and myelomeningocele. The questions addressed were what combination of child and family variables will predict play ability in a child with motor disability and do the learning materials in the home or levels of maternal or paternal education affect play ability in children with motor disabilities.

Two studies were conducted to establish reliability with the Test of Pretend Play (ToPP) and to determine if children with delayed development would exhibit a delay. One study was done to establish reliability for the Fluharty-2.

The results of the main study demonstrated a significant positive correlation between ToPP scores and the learning material subscale (LMS) scores of the Home Observation for Measurement of the Environment Inventory and maternal education. The LMS scores were significantly correlated with family income, maternal and paternal education. The ToPP scores were not significantly correlated to income or paternal education. Age of the child was significantly positively correlated with ToPP scores and the LMS scores. Fifty-three percent of the children exhibited delays in play. The child's age and the maternal level of education accounted for 60% of the variance in ToPP scores. Children with cerebral palsy and myelomeningocele appear to be at greater risk for pretend play delays than children with developmental delay and genetic disorders. More research is needed to further elucidate the role of play in children with motor disabilities.

KEYWORDS: Play, Children, Motor Disabilities, Maternal Education, Home Environment

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_____August 5, 2014_____

PLAY IN CHILDREN WITH MOTOR DISABILTIES

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CHAPTER ONE

INTRODUCTION AND REVIEW OF THE LITERATURE

WHAT IS PLAY?

Play is a universal (Smith, 2010) and important activity for a child and is necessary for healthy brain development (Byers, 1998; Byers & Walker, 1995; Fox, Levitt, & Nelson, 2010; Nielsen, 2012; Shonkoff & Phillips, 2000). Play has been defined as a spontaneous, naturally occurring activity with objects that engages attention and interest (Lifter & Bloom, 1998; Lifter, Mason, & Barton, 2011). Play provides learning opportunities in all domains of development. As such, play is important for physical (Pelligrini & Smith, 1998), cognitive (Piaget, 1952, 1962; Vygotsky, 1967), and social development (Mead, 1934). Physical play affords a child the opportunity to move and be active. Play as a cognitive process involves problem solving and imagination. Emotionally, children can play out wish fulfillment and learn about social roles. Play is a form of communication both socially and linguistically. A limitation in play may impede participation in life situations and learning.

Play is a multidimensional construct which can involve physical, social, cognitive, language, and adaptive development. Parten's social participation categories of play were defined in 1932 as part of a study on free play in preschool children. Her descriptions of solitary, onlooker, parallel, associative, and cooperative play are in Table 1.1. Subsequently, Smilansky (1968) identified four categories of cognitive play in preschoolers based on Piaget's work (1962). The four categories consisted of functional play, constructive play, dramatic play and games with rules. These categories are

defined in Table 1.2. Dramatic play is the same as symbolic or pretend play. Originally the four types of play were thought to develop in order but constructive or construction play and pretend play emerge at similar times.

Table 1.1 Parten's Types of Social Play

Type of Social Play	Characteristics
Solitary	Child is alone, play is self-contained.
Onlooker	Child watches the play of others with no actual participation beyond some communication such as question/answer.
Parallel	Child plays independently with toys that are like what the other child is playing with, each child is playing independently but aware of what the other is doing. There is no exchange of materials.
Associative	Child plays with one child or more with some shared material, activity and communication. There is not a great deal of social exchange.
Cooperative	Child plays in a group where there are rules or goals.

Source: Parten, M. B. (1932). Social participation among preschool children. *Journal of Abnormal Psychology.* 27, 243-269.

Table 1.2 Smilansky's Stages of Play Development

Type of Play	Characteristics
Functional	Child repeats movements with or without objects.
Constructive	Child uses play materials to create something that lasts after the child has finished playing such as a block tower.
Dramatic/Pretend	Child uses objects to represent something other than what it is such as using a block for a piece of cake. The child may pretend to be a superhero or to be having a tea party.
Games with Rules	Child uses rules to participate in play with others. This is usually not achieved in preschool but does continue into adult life.

Smilansky, S. (1968). *The effects of sociodramatic play on disadvantaged preschool children*. (pp. 5-7). New York, NY: Wiley & Sons.

Play is a ubiquitous topic in early intervention and early childhood education because children develop the ability to play as they explore and contact the environment (Lifter, Foster-Sanda, Arzamarski, Briesch, & McClure, 2011; Linder, 2008;

Nicolopoulou, Barbosa de Sa, Hgaz, & Brockmeyer, 2010). Play provides opportunities to attend to objects and learn cause and effect. Play informs social and psychological development. Some types of play can be used as measure of a child's socio-communicative skills. Three significant findings are reported in a review of the play research over the last 25 years: 1. Children with disabilities demonstrate delays in play compared to typically developing children; 2. Play is a functional goal for children with disabilities and 3. Interventions to increase play skills of children with disabilities is effective (Lifter, Mason, & Barton, 2011).

Play enables typically developing children to learn sensorimotor rules and progress cognitively to master symbolic or pretend play (Barton, 2010). A taxonomy of pretend play was developed by Barton (2010) to provide an operationalized definition of pretend play for research. The first stage of play is termed sensorimotor and is described as infant mouthing, banging or shaking toys. A second stage, called relational play, involves dumping and filling toys, stacking blocks and putting nesting cups together. The third stage is functional play characterized by cause and effect and putting together a simple puzzle. The last stage is pretend play where one object is substituted for another such as using a banana for a telephone. Symbolic functioning in play is developed during the second year of life (Casby, 2003a).

Children develop the ability to play as they explore and contact their environment. Exploration requires an ability to move, to interact with people and objects within the environment, the cognitive ability to recognize connections, and develop mental images of objects not in view. Mental representation of objects is

necessary in pretend or symbolic play. Pretend play is defined as substituting one object for another, referring to an absent object as if it were present and attributing an imaginary property to someone or something (Baron-Cohen, 1987). Examples of pretend play include pretending a block is a telephone, giving a baby doll a bottle, giving a doll a drink from a toy cup and pretending to be a superhero. Pretend play emerges between 18 and 24 months of age in typically developing children (Casby, 2003a).

Importance of Play

Play engages a child in the natural environment which is most often but not always the home. It provides the child an opportunity to learn about objects. Development of mental representation of those objects supports the acquisition of pretend play. Play decreases social isolation and increases the potential for learning in all domains. Play promotes generalization and maintenance of psychomotor skills. Pretend play abilities are associated with language and social skills. Pretend play and language have similar developmental trajectories which reflect the development of mental representation (Lifter et al, 2011; McCune, 1985; McCune, 1995). Pretend play helps children learn to self-regulate their behavior (Vieillevoye & Nader-Grosbois, 2008).

Demonstration of pretend play can act as a marker of social competence (Howes & Matheson, 1992). Preschool-age children who participate in complex turn-taking during social pretend play are considered competent socially (Howes et al, 2011). Children in their sample developed play forms at the expected ages and in the expected sequence. The frequency and type of play that these children engaged in varied with the quality of the child-care setting. Children in less than adequate child-care settings

engaged in less complex play while children in good-quality care demonstrated more frequent complex play.

LTERATURE REVIEW

PLAY AS PARTICIPATION

According to the International Classification of Function, Disability, and Health (World Health Organization (WHO), 2007), participation is defined as 'involvement within a life situation'. Engaging in play has been identified as a major life area by WHO (2007). All current measures of participation for children include play items (Chien, Roger, Copley, & Skorka, 2014) as play contributes to how a child participates in life. One of the newer tools developed to measure participation is the Assessment of Preschool Children's Participation (APCP)(Law, King, Petrenchik, Kertoy, & Anaby, 2012). Its developers addressed the existing age gap in currently available assessment tools. Previous tools had only included children as young as 5 years of age. The APCP (Law et al, 2012) measures activity participation in children 2 – 5 years, 11 months. The Child Engagement in Daily Life (Chiarello, Palisano, Mc Coy, Bartlett, Wood, Chang, Kang, & Avery, 2014) was developed by a team of researchers interested in participation in young children with cerebral palsy. Participation measures need to include play items especially in young children because pretend play emerges between 18 and 24 months (Casby, 2003). By 3 years of age, typically developing children engage in this type of play 20% of the time (Haight & Miller, 1992). Pretend play is at its peak in 4 year olds who engage in imaginative suspension of reality (Fein, 1981). Sociodramatic play including role playing is evident in 4 year olds (Fein, 1981). A study of participation patterns by

Dunst, Hamby, Trivette, Raab, and Bruder (2002) showed that a child's age and activity interacted to produce a great deal of variability in overall rates of participation. The survey included data for 50 family and 50 community activities. The activities were categorized by learning opportunities provided for children in the home, during family activities and during community activities. The percentages of children participating in the activities were computed. Participation patterns in this study varied relative to the child's age and the specific type of community or family activity.

Frequency of participation in play activities has been found to be related to kindergarten readiness (Long, Bergeron, Doyle, & Gordon, 2005). In their study Long and colleagues (2005) looked at 71 typically developing children from 4. 5 to 6 years old about to enter kindergarten. They were screened for school readiness and the frequency of participation in play activities such as pretend play, coloring, painting, playing with playdough, playing with friends, building with blocks and looking at books. They found a moderate significant relationship between the frequency of participation in pretend games or dress-up and gross motor development. However, the frequency of participation in gross motor play and gross motor development was not significant. While assessing play in children is a legitimate means to measure participation in young children, play has not been used as an outcome measure in studies of children with disabilities.

Differences in participation have been linked to physical factors (Leung, Chan, Chung, & Pang, 2011) and environmental factors (Rosenberg et al, 2011; Son & Morrison, 2010). Deficits in motor and social skills were significantly associated with

participation in preschool children with developmental delay in the study by Leung and associates (2011). School environment and family income were not associated with participation in this study. Environmental factors rather than personal factors were the best determinants of frequency of participation in preschool children in the study by Rosenberg and colleagues (2011). Son and Morrison (2010) measured the home learning environment of typically developing children 36 and 54 months old. They used four subscales of the Home Observation for Measurement of the Environment (HOME) inventory (Caldwell & Bradley, 1984): learning materials, language stimulation, academic stimulation, and variety of experience to ascertain changes that might predict academic skill and language development. There was improvement in the home environment over the year and a half time period. Changes in the home environment were predictive of children's language development but not academic skills. The learning materials subscale score was the most highly correlated to the change in measurement of home environment in this sample. Forty-six percent of the variance of intensity of participation of preschool-age children with cerebral palsy was explained by adaptive behavior and physical ability (Chiarello, Palisano, Orlin, Chang, Begnoche, & An, 2012). Participation of young children with cerebral palsy was found to vary by age and gross motor ability when assessed using the Child Engagement in Daily Life measure (Chiarello et al, 2014).

Pretend Play

Pretend play is different from other types of play because it is nonliteral. The use of objects to represent something else makes pretend play behavior more complex than

simple object play. Pretend play supports a child's development in motor, psychological and social domains. As such, it dominates most children's daily life and is an integral part of overall development. At its peak occurrence around 4 years of age, a child spends over 20% of the day engaged in pretend play (Haight & Miller, 1992). In this study a small number of middle-class children were followed longitudinally from the age of 12 months to 48 months in their natural environment. Beginning at 12 months and every 4 months through the age 48 months, children and mothers were observed for 3-4 hours. Mothers engaged in ordinary routines. Verbal and nonverbal episodes of pretend play were transcribed from videorecordings. The mothers were blind to the fact that pretend play was the focus of the study. All mothers were full-time caregivers and were college-educated. The mother was the initiator of the pretend play when the child was 12 months old. At 24 months, half of the episodes of pretend play were initiated by the child. Pretend play may be a marker of cognitive and social competence as well as early language (Rutherford & Rogers, 2003). DiCarlo and Reid (2004) described pretend play as a single-step action that appears to imitate a real-life situation involving objects that correspond to the toys used in the action. Their examples of pretend play include talking on a toy telephone, stirring a toy bowl with a toy spoon, giving a baby doll a bottle, giving a doll a drink from a toy cup and pretending to be a superhero. The use of toy objects to represent everyday objects is considered functional symbolic play, functional pretend play or functional play with pretense (Baron-Cohen, 1987; Barton, 2010; Barton & Wolery, 2008; Mitchell, 2007). The only actions in their examples that would be considered true pretend play based on the pretend play taxonomy are giving a

baby doll a bottle or giving the doll a drink from a toy cup assuming that the bottle and cup are empty and pretending to be a superhero.

Pretend play emerges between 18 and 24 months of age in typically developing children (Casby, 2003a). In order for pretend play to be present three elements must be observed. These are decentration, decontextualization, and symbolization (Casby, 2003b). When action is moved away from the self it is decentered, the child does something that is not typically done alone. Another example of decentration is seen when a child uses other agents in play such as a doll or teddy bear. Decontextualization refers to the divorcing of the actions from the surroundings, settings or contexts. The child that turns the couch cushions into a fort is decontextualizing. Lastly, symbolization is the easiest element to understand as the object is used to symbolize something else. The banana is a telephone, the stick is a microphone, a child's hand is used as a cup to give the teddy bear a drink.

Belsky and Most (1981) documented changes in infant play from simple manipulation to exploration of objects' uniqueness to pretense beginning in the last quarter of the first year and through the second year of life. Children's pretend play expands from solitary play to collaborative play. When the child directs pretend play toward another person it becomes social pretend play. Maternal – child interactions are frequently studied to gain insight into social pretend play (Haight & Miller, 1992). Mothers were found to initiate pretend play with children as young as 12 months of age. A child's pretend play schemes begin as single actions as described by DiCarlo and Reid (2004) but continue to develop into combinations of 2 play actions such as

pretending to comb one's own hair and then the doll's hair. Finally, multiple play actions are observed as in the planning and execution of an entire pretend tea party.

Pretend Play in Children with Disabilities

The nature of a child's disability affects play (Buchanan, 2009). For example, children with autism lack the ability to pretend (Charman & Baron-Cohen, 1997; Jarrold, 2003). In fact, the lack of pretend play in a young child is part of the diagnostic process for autism (Rutherford, Young, Hepburn, & Rogers, 2007). Children with autism show decreased social interaction that is related to their inability to engage in pretend play (Barton, 2010). Absence of social play in autism has been linked to deficits in social-emotional and cognitive development (Jordan, 2003), while higher levels of play have been found to be predictive of social function (Manning & Wainwright, 2010). Impoverished play may lead to impoverished environmental adaptation.

Children with disabilities even in an inclusive setting engage in more solitary play than typically developing children (Hestenes & Carroll, 2000; Odom et al, 2006). Hestenes and Carroll (2000) compared the play interactions of preschool-aged children with and without disabilities. Children were observed during free play and the level of their play was documented based on Parten's (1932) work. Both groups of children spent more time in fine and gross motor play than in dramatic play. The children with disabilities spent equal amounts of time in solitary play and cooperative play while those children without disabilities spent the majority of their time in cooperative play. Odom and colleagues (2006) looked at social acceptance and rejection of a younger group of children with disabilities in an inclusive preschool program. These researchers

found that communication-play was one of three qualitative themes related to social acceptance of the children with disabilities in their study. No children with autism were socially accepted while only a few children with physical or speech impairments were rejected. The more developmentally sophisticated children with less apparent delays were more likely to be socially accepted.

Prematurity is a risk factor for developmental dysfunction. High risk children born preterm are more likely to be delayed in play and language development (Herbert, Swank, Smith, & Landry, 2004). In their study, significant risk differences were found for the development of play and language in a group of children born preterm of low socioeconomic status families. This was a longitudinal study of developmental outcomes and parenting. Play was assessed during a 10 minute play session. The researchers found that the ability of mothers to maintain a child's attention and engagement during the play session could positively affect play development. Low risk and even "apparently normal" at risk infants were found to be deficient in motor development in a longitudinal study by Goyen and Lui (2002). They also found that the quality of the home environment positively influenced motor development. Maternal level of education has been shown to predict play competence in preterm infants (Fewell, Casal, Glick, Wheeden, & Spiker, 1996; Wang, Wang, & Huang, 2008). Evidence from basic science showing that motor areas contribute to learning and speech as part of cognition help explain the co-occurrence of motor and cognitive dysfunction seen in preterm infants (Abe & Hanakawa, 2009; Pitcher, Schneider, Drysdale, Ridding, & Owens, 2011).

Late preterm infants have also been found to have significant cognitive, motor and behavior problems at school age (Jain, 2008).

Children with cognitive deficits also show deficits in play (Hill & McCune-Nicolich, 1981; Malone & Langone, 1995). The level of pretend play has been highly correlated with mental age in children with Down syndrome (Hill & McCune-Nicolich, 1981). Other studies of children with Down syndrome (DS) have shown significant correlations between symbolic play and language development (Fewell, Ogura, Notari-Syverson, & Wheeden, 1997; Shimada, 1990). O'Toole and Chiat (2006) assessed pretend play as measured by the Test of Pretend Play (Lewis & Boucher, 1997), symbolic comprehension, language and nonverbal skills and found that they were all strongly correlated in 2 to 3 year olds with DS. By the age of 4 to 5 years, the only association demonstrated was between pretend play and language. It was theorized that because development of pretend play and the development of language both rely on representational ability their early developmental trajectories are similar. However, as language becomes more domain-specific, its trajectory diverges from pretend play which appears to be mature around the age of 6 as exhibited by role playing. Wright, Lewis and Collis (2006) studied 18 children with and 18 children without DS performing tasks of imitation and engaging in pretend play. The ToPP (Lewis & Boucher, 1997) was used to assess the children's ability to demonstrate decontextualized play. The two groups were matched to within 2 months based on developmental age. The children with DS were willing to imitate hiding an object when no object was present, to model an action which was not functional if imitated by the examiner and demonstrate

competence in pretend play. Age equivalent scores suggested that there was no difference in symbolic play in either group with respect to developmental age.

Children with motor disabilities such as myelomeningocele, cerebral palsy and developmental delay exhibit deficits in pretend play (Jennings, Conner, & Stegman, 1988; Pfeifer, Pacciulio, dos Santos, dos Santos & Stagnitti, 2011). The lack of exploration of the environment secondary to their motor involvement may make it more difficult for them to develop this advanced level of play. A literature review supports that children with disabilities play less and play less well (Childress, 2011; Jennings et al, 1988). Their play appears less complex and developmentally immature. Learning to explore and interact with objects and people and the environment through play may be difficult for young children with motor disabilities. The lack of mastery of the environment secondary to motor impairments in children with cerebral palsy has been discussed by Blanche (2008). A recent study demonstrated that 65% of children with cerebral palsy show delays in pretend play (Pfeifer et al, 2011). In this study, self-initiated pretend play was evaluated in 20 children aged 3 to 6 years with cerebral palsy. The purpose was to investigate the relationship between play ability and motor level severity. Children in this study who performed well were in Gross Motor Function Classification System (GMFCS) (Palisano, Rosenbaum, Bartlett, & Livingstone, 2007) levels I to III. Most children who performed poorly were at level V. Pfeifer and associates (2011) found a significant negative correlation between motor severity and pretend play. Landry and associates studied school-age children with spina bifida and found that these children spent more time in simple toy play and less time in goal-

directed play than typically developing children in their sample (Landry, Copeland, Lee, & Robinson, 1990; Landry, Robinson, Copeland, & Garner, 1993).

Children with many developmental disabilities exhibit delays in developing imaginative or pretend play (Jarrold, Boucher, & Smith, 1993; Malone & Langone, 1998). Children with physical disabilities have been found to have less mastery of their environment (Jennings et al, 1988). Children in this study which consisted of primarily children with myelomeningocele and cerebral palsy appear less motivated and less likely to develop goal-directed behavior than typically developing children. Typically developing children in this sample showed more motivation during free play and during structured tasks than did those children with physical disabilities. Typically developing children played longer, had more complex play and played at a higher cognitive level than children with disabilities. Children's playfulness has been related to the parents' responsiveness and to the child's developmental abilities (Chiarello, Huntington, & Bundy, 2006). Children in this study had diagnoses of cerebral palsy, developmental delay, DS, and prematurity. None of the children were walking independently and all were receiving early intervention services. There was no difference in playfulness when children played with their fathers or their mothers. Parents adapted their interactions to meet the physical needs of their children. Children with limited mobility, less engaged parents, and limited learning materials are at risk for delayed pretend play skills. Nehring (1989) found that the interaction of parents of preschool children with DS adversely affected the development of pretend play because the parents focused more on teaching their child skills. The caliber and content of a mother's interaction with a

child can affect the ability of the child to engage in play and develop language (Haight & Miller, 1992; McCune, 1995; Tamis-LaMonda, Bornstein, & Baumwell, 2001). A deficit in pretend play in a child is likely to result in participation restrictions, learning problems, and difficulty in peer interactions (Stagnitti & Unsworth, 2000).

The Home Environment and Play

The home environment exerts a very strong influence on development regardless of whether children are typically developing or have developmental problems (Bradley et al, 1989; Fewell et al, 1996; Venetsanou & Kambas, 2010). Differences in participation, of which play is an integral part, have been linked to environmental factors (Leung, Chan, Chung, & Pang, 2011; Lewis, Boucher, Lupton, & Watson, 2000; Rosenberg, Jarus, Bart, & Ratzon, 2011; Son & Morrison, 2010). Play development has been linked to cognitive skills (Lifter & Bloom, 1989), self-regulation (Viellevoye & Nader-Grosbois, 2008), problem-solving and meta-cognition (Whitebread, Coltman, Jameson, & Lander, 2009). Play can be considered a developmental domain therefore it is important that therapists feel empowered to reliably assess pretend play skills in children with disabilities not only in the home but in multiple settings.

The first environment a child is exposed to is the home. This environment affords the child the opportunity to play. The physical environment consists of the potential objects that could be played with and therefore can afford opportunities to engage in motor, perceptual and social action. The Home Observation for Measurement of the Environment (HOME) Inventory (Caldwell & Bradley, 2003) has been used for nearly 4 decades to assess the contribution of the home environment to child development and

is considered the gold standard (Bradley, 2010). Totsika and Sylva's (2004) review of studies using the HOME noted that the higher the HOME scores the more enriched the environment. Scores on the learning materials subscale of the HOME have been most strongly correlated with a child's developmental status (Bradley, Rock, Caldwell, & Brisby, 1989). In a recent study, Son and Morrison (2010) used four subscales of the Early Childhood HOME to define the home learning environment in a preschool population. The subscale with the largest effect size was the learning materials subscale with a Cohen's *d* of 1.08. To date there have been no studies that have looked at the relationship between the learning materials subscale of HOME and a child's pretend play ability or the effect of the learning materials in the home specifically on a child's pretend play.

Object interaction within the home is an example of a perceptual-motor behavior that affords the child the possibility of learning and exploring (Lobo, Harbourne, Dusing, & McCoy, 2013). Ecologic and affordance theories support the idea of the environment providing opportunities for action and the resources with which to act (Bronfenbrenner, 1979; Gibson, 1979; Gibson, 2002). The effect of the home environment on infant development has been studied by Abbot and colleagues. Their literature review supports that there is a link between the environment and infant development (Abbott & Bartlett, 1999). Furthermore, toys in the environment were found to provide stimulation for both gross and fine motor development (Abbott & Bartlett, 2000). A subsequent study suggested that higher infant motor scores are associated with a more stimulating home environment as measured by three subscales

of the HOME inventory despite low and non-significant correlations (Abbott, Bartlett, Fanning, & Kramer, 2000). The researchers recommended a tool be developed that would be more sensitive to measuring motor development affordances.

Venetsanou and Kambas (2010) reviewed 57 studies which looked at environmental factors affecting preschoolers (2-6 years). Because motor development occurs in a social-cultural context the mother was acknowledged as the central figure in the child-rearing process. Siblings, quality of living conditions, socioeconomic factors and exposure to day care or preschool were also factors identified as having an effect on motor development and subsequently on play. Piek, Dawson, Smith, and Gasson (2008) found that gross motor development accounted for a significant part of the variance in cognitive development in a group of low risk children when socioeconomic factors were controlled. Piaget (1952) previously recognized this relationship. It is not known how the learning materials available in the home affect a child's pretend play ability or how having a motor disability affects pretend play ability.

The Affordances in the Home Environment on Motor Development (AHEMD) is a parent report questionnaire developed for use with children from 18 to 42 months (Gabbard, Cacola, & Rodrigues, 2008). It was constructed based on both ecological and affordance theories that support the premise that stimulation in the home can positively affect motor development (Diamond, 2000). Space inside and outside the home is rated along with the variety of the stimulation. Lastly, gross and fine motor toys are rated on a score of 0-4, 4 being the highest and 0 being very low. To date no one has

looked at how these same affordances in the home could enhance play abilities or how play may enhance motor development.

THE FAMILY AND PLAY

Pretend play begins as a solitary action but quickly progresses to become a collaborative venture between a parent and a child. Haight and Miller (1992) studied the everyday pretend play of children in the home. By 3 years, the children were spending 20% of their play time engaged in pretend play. This percentage rose to 50% at 4 years. Children pretended equally with their mothers and other children at age 3. When observing home play of toddlers with disabilities Buchanan (2009) found that the mothers actively supported their children and engaged in various strategies to support play. She urged that parental perceptions are important when providing assessment and intervention. Intervention with children with motor disabilities has to go beyond movement into the larger realm of social play and cognition (Lobo et al, 2013).

Children exhibit more complex, diverse, and sustained pretend play when paired with a more sophisticated partner (Lillard, 2007; O'Connell & Bretherton, 1984). Bornstein, Haynes, O'Reilly and Painter (1996) sought out individual variations in the mother and child when involved in pretend play. The mother's symbolic play and the child's language positively influenced the child's collaborative play. The child engaged in play longer with maternal involvement. A highly interactive parenting style and a high level of maternal responsivity have been associated with positive changes in social-emotional, cognitive and language development in children (Tamis-LeMonda, Bornstein, & Baumwell, 2001; Warren & Brady, 2007). Mothers' verbal intelligence and physical

affection, and the child's gender influenced mothers' play and so influenced the child's collaborative play indirectly. Modeling of play increased pretense (Lillard, Nishia, Massaro, Vaish, & Ma, 2007) and generation of novel pretend acts (Nielsen & Christie, 2008).

Level of maternal education has been shown to positively correlate with a child's developmental progress. Studies have shown that the higher the maternal education level the better the child's developmental progress (Fewell et al, 1996; Jackson, Brooks-Gunn, Huang, & Glassman, 2000). Conversely, low levels of maternal education have been shown to increase risk for developmental delay (Najman, Bor, Morrison, Anderson, & Williams, 1992). Higher income has a positive effect on child development (Jackson et al, 2000). Maternal level of education predicted play competence in preterm infants (Fewell et al, 1996, Wang, Wang, & Huang, 2008). The people in the child's home environment can scaffold and direct play. Scaffolding is a process of providing support for the child's interaction with the environment much like a scaffold is often erected to support the construction of a building. Maternal education level, early learning, and positive caregiver-child interaction have been identified as protective factors against developmental inequalities (Walker et al, 2011). Lack of early opportunities contributes to decreased developmental potential. To date no studies have looked at the relationship between the educational level of both parents and the pretend play ability of children with motor disabilities.

PURPOSE OF RESEARCH

Children with motor disabilities who lack the ability to explore their environment are at risk for exhibiting delays in pretend play. Pretend play is the focus of this research because it is the most sophisticated and complex type of play. Pretend play affords the child with opportunities to participate in life. Pretend play has not been used as the outcome measure in research of children with motor disabilities. The home environment and the educational levels of parents impact development but the effect of these factors on a child with motor disabilities ability to engage in pretend play has not been sufficiently explored. The purpose of this research study is to explore and describe the association among the child, the family, the home environment, and pretend play ability in children from 2 years 0 months to 5 years 11 months with mild to moderate motor disability. The environment is a powerful force in infancy and early childhood development. This research study is based on Bronfenbrenner's ecological theory of development and the ubiquitous role of play in all domains of development. The study will look at certain child and family variables and explore how they relate to pretend play in children with motor disabilities.

Research Questions

The major research question is what combination of child and family variables will predict pretend play ability in a child with motor disability? Variables to be explored are income, education, family structure, and level of motor disability. Additional research questions to be answered by this study include: Do the learning materials in the home affect the pretend play ability of a child with a motor disability? Does the level

of maternal or paternal education affect the pretend play ability of a child with a motor disability?

TOOL SELECTION

TEST OF PRETEND PLAY

The Test of Pretend Play (ToPP) (Lewis & Boucher, 1997) was chosen as the dependent measure in the study. The ToPP is a standardized tool that measures pretend play in typically developing children from birth to 6 years. It has two versions, a nonverbal version for children up to three years of age and a verbal version for use with children three years and older who are able to follow the verbal directions. The ToPP may be used with children with disabilities up to 8 years of age (Lewis & Boucher, 1997). Content and concurrent validity has been established (Lewis & Boucher, 1997). This tool was chosen because of its ease of administration and presence of age norms.

The ToPP consists of four sections: self with everyday objects; toy and non-representational materials; representational toys alone and self alone. Prior to testing the manual recommends a familiarization session for the child and the tester to become comfortable with each other. The two play together in the same location that the test is to be given. They do not play with the test materials. Prior to the beginning of the test, there is a warm-up period where the child is first provided with representational objects and then non-representational objects. The child should engage in some form of symbolic play as evidenced by combining the objects prior to presenting the first test item. If the child does not engage in symbolic play within the first 2 minutes of the

warm-up, the examiner can model object substitution for the child (Lewis & Boucher, 1997). Table 1.3 further describes the test.

Table 1.3 Description of Test Items in the Test of Pretend Play

Section	Description
I. Self with everyday objects	A single item assesses the ability to make reference to an absent object when supported by everyday objects.
II: Toy and non-representational materials	There are four items, each involving a doll and one or more pieces of non-representational material. The items assess the ability to substitute one, two, three and four pieces of non-representational material for pretend object(s) and, when two or more pieces are involved, to substitute them for pretend objects in some related way.
III: Representational toy alone	There are four items that assess in turn the ability to make a teddy do something to, or with, an imaginary object in the absence of play materials, to make the teddy feel something, to make the teddy be something else and to make the teddy carry out a sequence of actions without play materials.
IV: Self alone	There are four items that assess in turn the child's ability to be something else, to do something to, or with, an imaginary object in the absence of play materials, to feel something and to carry out a sequence of actions without play materials.

Source: Lewis, V., Boucher, J., Lupton, L., & Watson, S. (2000). Relationships between symbolic play, functional play, verbal and non-verbal ability in young children. *International Journal of Language & Communication Disorders*. 35, 117-127.

The test progresses from simple interactions with a bowl and spoon to more complex substitutions with an increasing number of objects. For example, the child is expected to pretend to eat when given the bowl and spoon and prompted either

verbally or having the behavior modeled by the examiner. The second set of items relate to the number of objects the child can substitute for pretend objects. For example, the child is expected to pretend a yellow cylindrical object is a hat by placing it on the doll's head or using the object to feed the doll or the child might place the cylinder over the doll's foot or hand as if putting on a piece of clothing. The third set of items use a teddy bear. The child is either shown how the bear might take a drink or asked to have teddy be something like a bridge, do something like fly, or perform a series of actions such as getting up out of bed. Lastly, the child is asked to do things like ride a bicycle, be things such as a bunny, or carry out actions like going shopping without play materials being present. In the non-verbal version, the examiner models behaviors in the different categories that the child can repeat. In the verbal version, the examiner requests the child to do something. The child receives points for being creative rather than doing what the examiner has either modeled or requested verbally.

FLUHARTY-2

The Fluharty-2 was chosen to screen each child's language to determine the appropriate version of the ToPP to administer, verbal or non-verbal. The Fluharty-2 is a communication screening tool used for preschool speech and language (Fluharty, 2001). The ToPP manual recommends that when the ToPP is used with children with developmental disabilities, a measure of language also be administered. The ToPP was originally co-normed with the Preschool Language Scale (PLS-3) (UK) (Boucher & Lewis, 1997). That particular tool is now in its 5th version. The purpose of screening language for the main study, Play in Children with Motor Disabilities, is to determine which

version of the ToPP to administer. Therefore a screening tool was chosen based on recommendations from communication disorders faculty at the University of Kentucky (personal communication April, 2011). If a child is unable to complete the Fluharty-2, the child would be administered the non-verbal version of the Test of Pretend Play.

The Fluharty – 2 is based on Foster's model of language and was developed by Nancy Fluharty (2001). This is the second edition of the tool. It takes approximately 10 minutes to administer and is designed to screen expressive and expressive language in children from 3 years 0 months to 6 years 11 months. The tool was normed on over 700 children from 21 different states. The test exhibits high reliability based on reported alpha coefficients and Pearson r's (Fluharty, 2001). Test scores have been found to be stable over time.

Four subtests are used to determine an expressive and receptive age equivalent, percentiles and quotients. The two subtests for receptive language include repeating sentences and following direction and answering questions. The two subtests for expressive language include describing actions and sequencing events. There is an optional articulation subtest which was not used in the research study.

Gross Motor Function Classification System

The Gross Motor Function Classification System (GMFCS) (Palisano et al, 2007) expanded and revised will be used to determine the level of motor function of the children. This scale allows an experienced pediatric physical therapist to determine a motor level for a child with a motor disability. Levels I is walks without limitations, Level II is walks with limitations, and Level III is walks using a hand-held mobility device, Level

IV is limited self-mobility, and Level V representing the most serious limitation, being transported in a manual wheelchair. More detailed descriptions of these levels, based on age bands, were used for children between the ages of 2 and 4 years and between the ages of 4 and 6 years of age. GMFCS Level I, II and III were used to quantify mild to moderate motor disability in the children participating in this study. A child at Level IV or V was excluded from the study because children at these levels have significant limitations in self mobility and may use power mobility or require being transported in a manual wheelchair.

Learning Materials Subscale of the Home Observation for Measurement of the Environment

The Home Observation for Measurement of the Environment (HOME) (Caldwell & Bradley, 2003) inventory is a well-respected measurement tool for assessing the home environment. The instrument is based on the importance of the home as a learning environment and that an actual visit to the home is the best way for pertinent information about the materials in the home that support development can be gathered. The physical and social environment affects the overall development of a child as evidenced by the correlations between measures of the home environment and later cognitive and social development. The most highly correlated measure of the home learning environment from the early childhood HOME inventory is the learning materials subscale (LMS) (Son & Morrison, 2010). The disability adapted versions of the Infant/Toddler LMS and the Early Childhood LMS will be used in this study. The

Infant/Toddler LMS consists of 9 items and the Early Childhood LMS consists of 13 items. Scores reflect the number of items in the specific subscales.

Affordances in the Home Environment for Motor Development

The Affordances in the Home Environment for Motor Development (AHEMD) is a relatively new inventory developed by Rodrigues, Sraiva, and Gabbard (2005). According to Gabbard, Cacola, and Rodrigues (2008) it measures characteristics of the home environment that afford opportunities specifically for motor development. The questionnaire is completed by a parent/primary caregiver report. In addition to family characteristics, it collects data on five subscales: outside space, inside space, variety of stimulation, gross motor and fine motor toys. Rodrigues and colleagues (2005) reported a scale reliability coefficient of 0.85 and construct validity of the instrument using 321 families. Copies of all tools used in the main study are found in Appendix A through F.

CHAPTER TWO

RELIABILITY STUDIES

A series of reliability studies were conducted to prepare for the main study, Play in Children with Motor Disabilities. The purpose was to establish inter-rater reliability and test retest reliability for the Test of Pretend Play (ToPP) in typically developing children and to determine if children with delayed development would have a delay in pretend play ability. A second purpose was to establish reliability for the Fluharty-2.

RELIABILITY OF THE TEST OF PRETEND PLAY IN TYPICALLY DEVELOPING CHILDREN

METHODS

Participants

The first reliability study participants consisted of a convenience sample of ten typically developing children from 17 months to 5 years 8 months of age and one parent of each child. The typically developing children and parents were recruited from the local area. The sample consisted of 10 children and 9 parents. Each parent of a study participant completed the Communication Developmental Age Scale of the Developmental Profile II (Alpern, Boll, & Shearer, 1984) for her child. Information about the typically developing children who participated in the first reliability study is found in Table 2.1.

Consent

The study was approved by the institutional review boards of the University of Kentucky and the University of Evansville. Consent was obtained from the parent by the primary investigator during the first visit. A copy of the consent form was provided to the parent.

Table 2.1 Participant Demographics and Characteristics

	Typically Developing Children N=10
Gender	
Female	4(40%)
Male	6(60%)
Ethnicity	
African American	1(10%)
Caucasian	9(90%)
Age in months: Mean (Range)	43.6 (17-68)

Procedures

During the first visit the child became familiar with the evaluator and the test room as suggested by the test manual. A familiarization session took place in a designated area in the Health Science Building at the University of Evansville prior to the test administration. The primary investigator administered the Communication Developmental Age Scale of the Developmental Profile II (Alpern, Boll, & Shearer, 1984) with the parent.

The ToPP was administered during the second visit in the same designated area. The play area was sufficient to allow the child to move freely and play with toys on the floor. The ToPP was scored simultaneously by the primary investigator and another rater during this second visit or the primary investigator scored the test and the second rater scored the ToPP from a video of the test session. This procedure was used to establish inter-rater reliability. A parent was present during the testing unless the child was more cooperative in the parent's absence.

The ToPP was re-administered on a third visit scheduled 7 to 14 days after the initial test session. Again the primary investigator scored the test to compare test 2

results with test 1 results to determine test-retest reliability. The second rater did not score the retest.

RESULTS

Inter-rater reliability and test-retest reliability were calculated using interclass correlations (ICC), (Model 3, 1). The two raters were shown to be reliable in assessing all participants. The ToPP test authors report a test-retest reliability of 0.868 ($p<0.001$) in the test manual (Lewis & Boucher, 1997). All typically developing children scored at or above their age level in pretend play. Inter-rater reliability was determined using intraclass correlation coefficients (ICC). ICC (3, 1) was 0.994 with a 95% confidence interval of .978 to .999 for the typically developing children. Test-retest reliability was 0.983 with a 95% confidence interval of .934 to .996 for the typically developing children. A Pearson r was calculated to determine the relationship between the typically developing children's scores on the ToPP and their language scores, r = 0.804 at a 0.01 level of significance. The ToPP scores also correlated with age, r = 0.832 at a 0.01 level of significance. Correlation results are in Table 2.2.

Table 2.2 Correlations of Age, ToPP, and Language in Typically Developing Children

		Test of Pretend Play		Language	
TD Children	Mean Age	Mean Score	Pearson	Mean Score	Pearson
N = 10	43.6 months	50.12 months	0.832**	67.2 months	0.804**

TD = typically developing
** correlation is significant at the 0.01 level

DISCUSSION

Based on the ICC results, the two raters were found to be reliable in

administering the ToPP to typically developing children. Both raters achieved acceptable intraclass correlation coefficients. The primary investigator achieved acceptable test retest reliability. The relationship between language and performance on the ToPP in typically developing children was shown to be positive based on Pearson r values. The typically developing children's scores on the ToPP were significantly correlated with their age and language scores.

RELIABILITY OF THE TEST OF PRETEND PLAY IN CHILDREN WITH DISABILITIES

METHODS

Participants

The second reliability study participants consisted of a convenience sample of ten children with disabilities from 17 months to 5 years 8 months of age and one parent of each child. The children with developmental disabilities and parents were recruited through local service providers. The sample consisted of 10 children and 8 parents. Each parent of a study participant completed the Communication Developmental Age Scale of the Developmental Profile II (Alpern, Boll, & Shearer, 1984) for her child. Information about the children with disabilities who participated in the second reliability study is found in Table 2.3.

Table 2.3 Participant Demographics and Characteristics

	Children with Developmental Disability N=10
Gender	
Female	5(50%)
Male	5(50%)
Ethnicity	
Biracial	1(10%)
Caucasian	9 (90%)
Age in months: Mean (Range)	41.7 (22-52)

Table 2.3 Participant Demographics and Characteristics (continued)

	Children with Developmental Disability N=10
Disability	
Cerebral palsy	2(20%)
Delayed development/low tone	3(30%)
Down syndrome	1(10%)
Prader-Willi syndrome	1(10%)
Myelomeningocele	1(10%)
Sensory integration	1(10%)
Speech delay	1(10%)

Consent

The study was approved by the institutional review boards of the University of Kentucky and the University of Evansville. Consent was obtained from the parent by the primary investigator during the first visit. A copy of the consent form was provided to the parent.

Procedures

During the first visit the child became familiar with the evaluator and the test room as suggested by the test manual. A familiarization session took place in a designated area in the Health Science Building at the University of Evansville prior to the test administration. The primary investigator administered the Communication Developmental Age Scale of the Developmental Profile II (Alpern, Boll, & Shearer, 1984) with the parent.

The ToPP was administered during the second visit in the same designated area. The play area was sufficient to allow the child to move freely and play with toys on the floor. The ToPP was scored simultaneously by the primary investigator and another rater during this second visit or the primary investigator scored the test and the second

rater scored the ToPP from a video of the test session. This procedure was used to establish inter-rater reliability. A parent was present during the testing unless the child was more cooperative in the parent's absence.

The ToPP was re-administered on a third visit scheduled 7 to 14 days after the initial test session. Again the primary investigator scored the test to compare test 2 results with test 1 results to determine test-retest reliability. The second rater did not score the retest.

RESULTS

Results of the individual assessments are in Table 2.4.

Table 2.4 Pretend Play in Children with Disabilities

Participant	Disability	Age (months)	ToPP Version	ToPP Score (months)	Play Delay (months)
1	DD	41	Verbal	35.3	5.7
2	DD, low tone	49	Nonverbal	29.3	19.7
3	DD, low tone	22	Nonverbal	31.3	
4	CP, spastic quadriplegia	49	Nonverbal	25.3	23.7
5	Speech delay	49	Verbal	63.3	
6	CP, spastic diplegia	49	Verbal	53.3	
7	Prader-Willi	23	Nonverbal	25.3	2.3
8	Down syndrome	52	Verbal	55.3	
9	MMC	36	Nonverbal	27.3	8.7
10	Sensory integration	47	Verbal	71.3	

DD = delayed development
CP = cerebral palsy
MMC = myelomeningocele

Fifty percent of the children with developmental disabilities in the second reliability study exhibited a delay in play while 50% did not. A difference of more than 2

months between the child's chronologic age and the ToPP score constitutes a delay. The age equivalent norms for the ToPP vary in 2 month increments. Therefore the difference needs to be greater than 2 months to constitute a delay. The clinical presentations of the children with a play delay included delayed development with and without low tone, Prader-Willi syndrome, spastic quadriplegic cerebral palsy, and myelomeningocele. Those children who did not exhibit a delay in play had spastic diplegic cerebral palsy, developmental delay and low tone, Down syndrome, and a speech delay.

Inter-rater reliability was determined in the same manner used for typically developing children. ICC (3, 1) for the children with disabilities was 0.993 with a 95% confidence interval of .974 to .998. Test-retest reliability was 0.982 with a 95% confidence interval of .929 to .995. A Pearson r was calculated to determine the relationship between the children with disabilities' scores on the ToPP and their language scores, r = 0.815 at a 0.01 level of significance. The Pearson r was not significant for age. Correlation results for children with disabilities are in Table 2.5.

Table 2.5 Correlations of Age, ToPP, and Language in Children with Disabilities

		Test of Pretend Play		Language	
Children with DD	Mean Age	Mean Score	Pearson	Mean Score	Pearson
N = 10	41. 7 months	41. 7 months	.533	40.8 months	.815**

DD= Developmental Disability
** correlation is significant at the 0.01 level

Results of the ToPP and the language assessment of individual children with disabilities are shown in Table 2.6.

Table 2.6 Play and Language in Children with Disabilities

Participant	Disability	Age in months	ToPP Score in months	Language Score in months
1	DD	41	35.3	56
2	DD, low tone	49	29.3	34
3	DD, low tone	22	31.3	28
4	CP, spastic quadriplegia	49	25.3	12
5	Speech delay	49	63.3	66
6	CP, spastic diplegia	49	53.3	50
7	Prader-Willi	23	25.3	24
8	Down syndrome	52	55.3	48
9	MMC	36	27.3	34
10	Sensory integration	47	71.3	56

The children in the two groups, typically developing and children with disabilities were similar with respect to age and gender (see Table 2.7). The typically developing children had a mean age of 43.6 months and the children with developmental disabilities had a mean age of 41.7 months. There were six boys and four girls in the typically developing group and five boys and five girls in the group with disabilities. Half of the ten children with disabilities exhibited a delay in pretend play. All five children had motor delays in development. One child had spastic quadriplegic cerebral palsy, was non-ambulatory and required support in sitting. One child had myelomeningocele and was beginning to ambulate with a walker. One child had Prader-Willi syndrome and presents with low tone, and two children had delayed development that was unspecified. The child with the most significant motor deficit, one of a set of triplets had the largest play delay.

There was an average 8.5 month difference in play scores between the typically

developing and the developmentally delayed groups. The largest difference in mean scores was observed in language. The typically developing group exhibited a mean language score of 67.2 months compared to 40.8 months in the group with disabilities.

Children with disabilities who exhibited delays in play tended to be only slightly younger, mean age 39.6 months compared to 42.6 months mean of all children with disabilities. The mean ToPP scores of children with disabilities and a play delay were 13.2 months lower than the mean of all children with disabilities. Their mean language scores were 7.8 months lower than all of the children with disabilities. The median play delay was 12.02 months with a range of 2.3 months to 23.7 months. The child with the smallest delay had Prader-Willi syndrome, had been enrolled in early intervention from birth, and had a parent pursuing a Ph.D. in early childhood education. The child with the largest delay was one of a set of triplets born to a single mother. Of the other children of the set, one had spastic diplegic cerebral palsy and one had a speech delay.

A comparison of the results is found in Table 2.7.

Table 2.7 Comparison of ToPP and Language Scores in Typically Developing Children and Children with Developmental Disabilities

		Test of Pretend Play		Language	
Group	Mean Age	Mean Score	Pearson	Mean Score	Pearson
TD Children N = 10	43.6 months	50.12 months	0.832**	67.2 months	0.804**
Children with DD N = 10	41. 7 months	41. 7 months	0.533	40.8 months	0.815**

Table 2.7 Comparison of ToPP and Language Scores in Typically Developing Children and Children with Developmental Disabilities (continued)

All children N = 20	42. 6 months	45.9 months	0.730 **	54 months	0.784**
Children with Play Delays N = 5	39. 6 months	28.5 months	0.688	32 months	0.938*

TD = typically developing
DD = developmental delay
* correlation is significant at the 0.05 level
** correlation is significant at the 0.01 level

DISCUSSION

There was a significant positive correlation between age and the scores on the ToPP as well as between age and language scores in the typically developing children. The relationship between age and scores on the ToPP was weaker in children with developmental disabilities, however, age and language were positively correlated in this group. The fact that only half of the children with developmental disabilities exhibited a delay in play scores could have weakened the correlation. A positive correlation was found between age and scores on the ToPP in the children with disabilities that exhibited a delay in pretend play. The older the child the more delayed the play scores. There was a significant correlation between the ToPP and language scores in the five children with disabilities who exhibited delays in play scores.

While the study sample does exhibit variability in the diagnoses of the children with disabilities, the fact that not all children with disabilities exhibited a delay in play may limit the generalizability of the results. Had all the children with disabilities

exhibited delays in pretend play, the author could be more confident in documenting the relationship among age, language, and pretend play in this group. Given that older children with play delays in this study appeared to be further behind than younger children in development of play skills may provide a direction for further research. Only one of the two children with genetic disorders demonstrated a play delay. The child with Down syndrome demonstrated above age performance on the ToPP despite having less than age appropriate language. She clearly expressed that she was going to play when she returned for her retest a week after her initial testing. The child with Prader-Willi demonstrated the smallest delay of all the children with a play delay. Both of these children experienced enriched environments and participated in early intervention which may have, at least to this point in their developmental trajectory, mitigated the effects of the genetic disorder on play development. The relationship between motor disability and play merits further investigation since the five children with delays in play also exhibited motor delays but not all children with motor delays exhibited delays in play. Other variables such as learning materials in the home and level of maternal and paternal education need to be explored as contributing factors to play ability in children with motor disabilities.

RELIABILITY OF THE FLUHARTY – 2

METHODS

Participants and Procedures

Four typically developing children were recruited from the faculty at the University of Evansville. Informed consent was obtained from a parent. One child

refused to participate. The remaining three participants ranged in age from 3 years 5 months to 5 years 6 months with a mean age of 4 years 5 months. All three children were male. Each child tested by the investigator was filmed. The investigator and a speech language pathologist scored each child separately and independently. Expected minimal reliability was $\geq$ 0.80.

RESULTS

The single measure ICC (3, 1) for the receptive language quotient was .898 with a 95% confidence interval of .107 to .997 (Table 2.8). There was a negative ICC for the expressive language quotient due to the lack of variance in the data. There was perfect agreement on the expressive language quotients for all three participants (Table 2.9). The ICC for general language quotient was .955 with a 95% confidence interval of .276 to .999 (Table 2.10).

Table 2.8 Receptive Language Quotient

Participant	1	2	3
Rater 1	106	109	118
Rater 2	112	118	115

Table 2.9 Expressive Language Quotient

Participant	1	2	3
Rater 1	94	115	103
Rater 2	94	115	103

Table2.10 General Language Quotient

Participant	1	2	3
Rater 1	102	113	112
Rater 2	103	113	102

DISCUSSION

Based on the ICC's the primary investigator can reliably administer and score the Fluharty-2 as part of the study of play in children with motor disabilities. It is important to use tools that are reliable and valid. A child who scores at or above a 3 year age-equivalent on either the receptive and expressive language section of the Fluharty-2 will be administered the verbal version of the ToPP unless the child is less than 3 years of age. A child who scores below a 3 year age-equivalent on either the receptive or expressive language section of the Fluharty-2 will be administered the non-verbal version of the Fluharty-2. The general language quotient will be used as a representative score for language in all children in the main study.

SUMMARY

The primary investigator was found to have good reliability when using the Fluharty-2 to screen language and the ToPP to assess children's play age for children with and without disabilities ages 17 to 68 months. Inter-rater reliability for the ToPP was 0.994 with a 95% confidence interval of .978 to .999, and test-retest reliability was 0.983 with a 95% confidence interval of .934 to .996 for typically developing children. Inter-rater reliability for the ToPP was 0.993 with a 95% confidence interval of .974 to .998, and test-retest reliability was 0.982 with a 95% confidence interval of .929 to .995 in children with a developmental disability. Half of the children with disabilities exhibited a delay in play. Five of the children that exhibited delays in play also exhibited motor delays but not all children with motor delays exhibited a delay in play. The children with play delays had spastic quadriplegic cerebral palsy, myelomeningocele,

Prader-Willi syndrome, and developmental delay with or without low tone. The five children who did not exhibit a delay in play had spastic diplegic cerebral palsy, developmental delay with low tone, Down syndrome, and speech delay. The relationship between motor disability and play will be further explored in the main study.

Chapter THREE

MAIN STUDY: PLAY IN CHILDREN WITH MOTOR DISABILITIES

Research Questions

The major research question is: What combination of child and family variables will predict pretend play ability in a child with motor disability? Variables to be explored are income, education, family structure, and level of motor disability. Additional research questions to be addressed by this study include: Do the learning materials in the home affect the pretend play ability of a child with a motor disability? Does the level of maternal or paternal education affect the pretend play ability of a child with a motor disability?

It is hypothesized that in children with motor disabilities:

1. There will be a direct association between scores of pretend play (ToPP) and the learning material subscale score on the Home Observation for Measurement of the Environment Inventory;

2. There will be a direct association between scores of pretend play and income level;

3. There will be a direct association between scores of pretend play and level of parental education;

4. There will be an inverse association between scores of pretend play and level of motor disability;

5. Pretend play ability will be predicted by the score on the learning materials subscale of the Home Observation for Measurement of the Environment Inventory and the level of maternal education, and;

6. Pretend play ability will be predicted by a combination of child and family variables.

METHODS

Participants

The study participants were recruited by word of mouth, flyers left at day care centers, Easter Seals facilities and through local service providers in rural southern Indiana. The sample consisted of children with mild to moderate physical disabilities from 2 years 0 months to 5 years 11 months of age. Children were recruited and tested over a span of 4 months from May to October 2013. The goal was to collect data on at least 30 children to achieve 80% power at an alpha level of 0.05 (Table 3.1.).

Sample Size

Sample size was based on being able to determine a moderate to large correlation between pretend play and the home learning environment. A two tailed t-test was used to determine the sample size needed to detect a correlation coefficient in the moderate to large range (Field, 2005).

Table 3.1 Sample size calculation for different values of correlation coefficients

Correlation	Power	N Total
0.4	0.80	46
0.5	0.80	29
0.6	0.80	19
0.7	0.80	13
0.8	0.80	9
0.9	0.80	6

Consent

The study was approved by the institutional review board of the University of

Kentucky and the institutional review board of the University of Evansville. The informed consent is in Appendix G. When a child was identified as a possible participant, a phone interview was conducted with the parent/guardian to determine the child's eligibility for the study. A child was excluded if there was a diagnosis of autism, emotional disability, severe cognitive or physical disability confirmed by parent report. The study was explained to the parent/guardian and demographic data obtained. The first home visit was scheduled at a mutually agreeable time. Thirty-three children and 33 parents/guardians were recruited. One parent choose not continue during the phone interview, so the demographic data was destroyed per IRB protocol.

Procedures

Demographic data collected consisted of date of birth, contact information, highest level of maternal and paternal education, maternal and paternal occupation, and annual household income as a measure of socioeconomic status. Additional information about the number of siblings in the home, the child's favorite toy, hand preference, and participation in therapy, day care, or preschool was also obtained. If the child participated in day care, the rating by the State of Indiana was obtained. Indiana rates day cares based on 4 levels, level 1 being the lowest rating and level 4 being the highest rating. Preschools are not rated in Indiana. The demographic forms are in Appendix H.

Informed consent was obtained from the parent or guardian by the primary investigator at the beginning of the first visit. A copy of the consent form was given to the parent/guardian. The appropriate version of the disability-adapted learning

materials subscale of the HOME inventory (Caldwell & Bradley, 2003) was administered by interviewing the parent/guardian. Some items can be scored by observation. The disability-adapted Infant/Toddler version was used for children under 3 years of age and the disability-adapted Early Childhood version was used for children from 3 years to 5 years 11 months. The primary investigator reviewed the DVD of sample interviews and became familiar with the items on the disability adapted learning materials subscale. There are 9 items on the disability-adapted Infant/Toddler learning materials subscale and 13 items on the disability-adapted Early Childhood learning materials subscale. The possible range on the IT HOME for the LMS is 0 to 9 and the range on the EC HOME is 0-13. The learning materials subscale was scored based on interview responses from the parent/guardian or by observation of learning materials seen in the home per the manual instructions. A higher score indicate more learning materials are present in the home.

The primary investigator determined the gross motor level of the child using observation and the Gross Motor Function Classification System (Palisano et al, 2007). The Fluharty-2 (Fluharty, 2001) was administered to determine a language age equivalent. The primary investigator engaged the child in a period of free play with toys available in the home. This period of free play constituted the familiarization session suggested by the ToPP manual. The Affordances in the Home Environment for Motor Development *(*AHEMD) questionnaire (Gabbard et al, 2008) was left with the parent/guardian to be filled out before the next home visit. The second home visit was scheduled at a mutually agreeable date and time.

The ToPP (Lewis & Boucher, 1997) was administered during the second visit, following a warm-up period with the child. The non-verbal version of the ToPP was administered if the child was less than 3 years old or did not score at or above a 3 year age equivalent in expressive or receptive language. The verbal version of the ToPP was administered if the child was 3 years old and scored at or above a 3 year age equivalent on the Fluharty-2. The test was conducted in an area sufficient to allow the child to move freely and play with toys on the floor or while sitting at a bench. A parent or guardian was usually present during the testing unless the child was more cooperative in the parent's absence which was determined by observation.

The test administration was videotaped by a graduate student unless there was a mechanical malfunction or prohibition from doing so such as a child being in foster care. All testing was done in one session except for one child who had difficulty sustaining cooperation. No more than 2 weeks separated the two test sessions. This procedure was acceptable according to the ToPP manual. According to the test manual should a child fail "to substitute any piece of non-representational material for a pretend object throughout the warm-up, the structured test should not be attempted" (Lewis & Boucher, 1997, p. 11). One child failed to attempt a single ToPP item and was given a score 1 month below the lowest possible age-equivalent for passing 1 test item. After the testing, the AHEMD questionnaire was collected from the parent/guardian. The parent was given a $10 gift card for the child as a thank you for participating in the study.

Data Management

Each child was assigned a number that was used to subsequently identify all data after the informed consent was signed. Only numbers were used on test record forms. The primary investigator was the only person with access to the coding master list which was kept in a locked cabinet in the primary investigator's office. Study data were collected and managed using research electronic data capture (REDCap) tools hosted at the University of Kentucky (Harris, Taylor, Thielke, Payne, Gonzalez, & Conde, 2009). REDCap is a secure, web-based application designed to support data capture for research studies. Data was analyzed using SPSS Version 22.

RESULTS

Thirty-two children and 32 parents/caregivers participated in the study from 30 homes. Two parents/guardians had 2 children enrolled in the study. There were 17 girls and 16 boys ranging in age from 24.8 to 61.3 months with a mean of 33.73 (SD 9.3) months. Demographic data was analyzed by frequency and means. Ninety-four percent of the participants (n= 30) were Caucasian and 6% (n=2) were African American. This proportion does reflect the racial makeup of the region. Twenty-four of the 30 homes consisted of 2 parent families, 6 homes consisted of single parents, all females, and 2 homes had a male presence who was not the child's father. Levels of maternal and paternal education ranged from 12 to 19 years with a mean of 14.58 (SD 1.98) years for mothers and 13.96 (SD 2.6) for fathers. Fathers' level of education was not known in 4 cases. Household income ranged from under $10,000 to over $50,000. The highest frequency (34.4%) of families was in the highest bracket with only 15.6 % of families in the lowest bracket. Fourteen mothers were employed outside the home. Seventeen

mothers were homemakers, 3 of whom received disability benefits, and one mother was a student. All fathers in the home except for 1 were employed. The range of employment was from an expert mover to a CEO of a company. In 23 homes (76.6%) the children in the study had at least one sibling. The range was 0 siblings in 7 homes (23.3%) to a high of 4 siblings in 3 homes. The demographic information about the families is in Table 3.2.

Table 3.2 Family Demographics

	Children N=32	Parent/Caregiver N=32
Gender		
Female	17 (53.1%)	32 (100%)
Male	15 (46.9%)	
Ethnicity		
African American	2 (6.3%)	2 (6.3%)
Caucasian	30 (93.8%)	30 (93.7%)
Age in months: Mean	33.73 (9.3)	N/A
Range 24.8 – 61.3		
Current employment status	N/A	
Employed		14 (44%)
Not employed		18 (56%)
Highest level of maternal education	N/A	
High School		8 (25%)
College (some or all)		20 (62.5%)
Master's		3 (9.4%)
PhD or JD		1 (3.1%)
Highest level of paternal education	N/A	
Middle School		1 (3.1%)
High school		13 (40.6%)
College (some or all)		10 (31.4%)
Master's		3 (9.4%)
Phd or JD		1 (3.1%)
Unknown		4 (12.5%)

Table 3.2 Family Demographics (continued)

	Children N=32	Parent/Caregiver N=32
Annual income		
Under $10,000		5 (15.6%)
$10,000 to $15,000		3 (9.4%)
$15,000 to $25,000		2 (6.3%)
$25,000 to $35,000		5 (15.6%)
$35,000 to $50,000		6 (18.8%)
$50,000 and over		11 (34.4%)
Family structure		N= 30
Single adult		6 (20%)
Two adults		24 (80%)
Siblings in the home		
Yes 23 (77%)		
No 7 (23%)		
Mean 1.3 Range (0-4)		

The children in the study all had mild to moderate motor disabilities based on their GMFCS levels. Thirty children had cerebral palsy, genetic disorders, delayed development, or myelomeningocele. Two children had torticollis, one of whom was diagnosed with Klippel Feil, a genetic disorder, during the testing. Child participant characteristics are in Table 3.3. The GMFCS levels ranged from I to III. Children with levels IV and V were excluded from the study. The majority of the children regardless of motor disability were classified as level I (75%), 12.5 % were classified as level II, and 12.5 % were classified as level III. Children in the study received a wide range of therapeutic services including Early Head Start, physical therapy, occupational therapy, speech therapy, and developmental therapy.

Table 3.3 Child Participant Characteristics

	Children N= 32
Disability	
Cerebral palsy (diagnosed or suspected)	8 (25%)
Chromosome disorders (1 unspecified)	9 (28%)
Achondroplasia (1)	
DiGeorge syndrome (1)	
Down syndrome (3)	
Marfan syndrome (1)	
Prader-Willi syndrome (1)	
Klippel-Trenaunay syndrome (1)	
Delayed development/motor delay	9 (28%)
Myelomeningocele	4 (13%)
Torticollis	2 (6%)
Gross Motor Function Classification System	
Level I	24 (75%)
Level II	4 (12.5%)
Level III	4 (12.5%)
Fluharty Speech and Language Screening Test	
Receptive or expressive language at 3 years or above	6 (19%)
Receptive and expressive language below 3 years	26 (81%)
Day Care	
Yes (4 rated Level 4, 1 rated Level 3, 5 private not rated)	9 (28.1%)
No	23 (71.9%)
Preschool	
Yes	5 (16%)
No	27 (84%)
Therapy	
Physical Therapy	28 (87.5%)
Occupational Therapy	14 (43.75%)
Speech Therapy	16 (50%)
Developmental Therapy	11 (34%)
Early Head Start	3 (9%)

Language ability of the children was used to determine which version of the ToPP would be given. Eighty-one percent of children in the study were given the non-

verbal version of the ToPP and 19% were given the verbal version. The majority of children in the study did not attend day care or preschool. Of those who attended day care, 5 out of the 9 were in private homes not rated by the state of Indiana. The other 3 day care centers had level 3 and 4 ratings. Level 4 is the highest possible. Five older children in the study attended preschools which are not rated in the state of Indiana.

LMS scores for the homes of the 24 children in the study under the age of 3 ranged from 3 to 9 with a mean of 6.7 (SD 1.92). The reported mean for the LMS of the IT HOME is 6.4 (SD 2.4) (Caldwell & Bradley, 2003). The LMS scores in 8 homes were below that mean. The EC LMS scores ranged from 8 to 12 with a mean of 10.63 (SD 1.3). The reported mean for the LMS scores of the EC HOME is 6.6 (SD 3.5) (Caldwell & Bradley, 2003). The LMS score was above the mean in all the homes of the children 3 years or older. The results of the ToPP, GMFCS, and LMS scores are in Talbe 3.4.

Table 3.4 ToPP Scores, GMFCS Levels, and LMS Scores

Participant	ToPP Version	ToPP Score in months	GMFCS Level	LMS Type	LMS Score
1	NV	19.3	I	IT	7
2	NV	39.3	I	EC	8
3	NV	17.3	I	IT	3
4	NV	31.3	I	IT	9
5	NV	19.3	I	IT	9
6	NV	29.3	I	IT	9
7	NV	17.3	I	IT	9
8	NV	27.3	III	IT	9
9	NV	29.3	II	IT	9
10	NV	15.3	I	IT	6
11	NV	31.3	I	IT	9
12	NV	27.3	I	IT	7
13	V	49.3	II	EC	11
14	NV	27.3	I	IT	9
15	V	63.3	I	EC	10

Table 3-4 ToPP Scores, GMFCS levels, and LMS Scores (continued)

16	V	39.3	III	EC	11
17	NV	19.3	III	IT	5
18	V	41.3	I	EC	12
19	NV	31.3	I	IT	8
20	NV	31.3	I	IT	7
21	NV	23.3	I	EC	12
22	NV	17.3	I	IT	4
23	NV	33.3	I	IT	6
24	NV	23.3	II	IT	6
25	NV	19.3	I	IT	5
26	NV	31.3	I	IT	5
27	NV	11.2	II	IT	5
28	V	49.3	III	EC	11
29	NV	55.3	I	EC	10
30	NV	39.3	I	IT	7
31	NV	25.3	I	IT	4
32	NV	25.3	I	IT	5

V= verbal N = nonverbal IT = infant/toddler EC = early childhood

Test for Normality of the Data

The Shapiro-Wilk test of normality was performed to assess for normal distribution of the data. Results are in Table 3.5. ToPP age equivalents, LMS scores, and total AHEMD score were normally distributed, however, age, maternal and paternal education, income, and the general language quotient (GLQ) of the Fluharty-2 were not.

Table 3.5 Shapiro-Wilk Test

	Statistic	Df	Significance
Age	0.811	28	0.000
Maternal Education	0.912	28	0.022
Paternal Education	0.878	28	0.004
Income	0.808	28	0.000
GLQ	0.716	28	0.000
ToPP	0.927	28	0.051
LMS Score	0.945	28	0.150
Total AHEMD Score	0.966	28	0.480

Correlations

Spearman rho correlations were calculated to ascertain the associations between variables in the study as not all variables were normally distributed. These correlations are in Table 3.6.

Table 3.6 Spearman Rho Correlations

	ToPP	GLQ	LMSS	AHEMD	Income	Mat Ed	Pat Ed
Age	0.639**	0.495**	0.501**	0.409*	0.197	0.072	0.012
ToPP		0.497**	0.597**	0.231	0.222	0.321*	0.203
GLQ			0.515*	0.507**	0.299*	0.291	0.054
LMSS				0.372*	0.522**	0.319*	0.493**
AHEMD					0.447*	0.072	0.272
Income						0.414*	0.725**
Mat Ed							0.560**

GLQ = general language quotient
LMSS = learning materials subscale score
** Correlation is significant at the 0.01 level (1 tailed)
* Correlation is significant at the 0.05 level (1 tailed)

Age was significantly correlated with ToPP, GLQ, LMS and AHEMD. Additionally, the ToPP was significantly correlated to maternal education but not paternal education. The GLQ was significantly correlated to the LMS, AHEMD and income. The LMS was significantly correlated with age, maternal and paternal education. The AHEMD was not significantly correlated to the ToPP, maternal or paternal education but was significantly correlated to age and income.

Pretend Play and GMFCS Levels

Fifty-three percent of children in the study exhibited delays in play on the ToPP, see Table 3.7. Of the 17 children who exhibited delays in play, 12 of them were classified at a GMFCS Level I, 2 were classified at GMFCS Level II and 3 classified at GMFCS Level III, see Table 3-8. A very similar break down was seen in the 15 children without a delay

in play, as 12 were classified at a GMFCS Level I, 2 at GMFCS Level II and 1 classified at GMFCS Level III. Of the children with cerebral palsy or suspected cerebral palsy 6 exhibited play delays and 2 did not. Both children without a delay in pretend play were classified at a GMFCS level II. Of the children with delayed development or motor delay, 4 children exhibited a play delay and 5 did not. Of the children with genetic disorders a further breakdown is helpful. Two of the children with Down syndrome exhibited delays in pretend play and one did not. Children with torticollis and many genetic syndromes did not exhibit delays in play while a child with Marfan's had a play delay. Three of the 4 children with myelomeningocele demonstrated a delay in play. The two children with torticollis did not exhibit any delay in play.

Table 3.7 ToPP Scores and GMFCS Levels

Participant	Disability	Age in months	ToPP Score in months	Play Delay in months	GMFCS Level
1	Developmental delay	27.1	19.3	7.8	I
2	Developmental delay	40.9	39.3		I
3	Motor delay	30.1	17.3	12.8	I
4	Torticollis	27.7	31.3		I
5	Stiff, motor delay	27.7	19.3	8.4	I
6	Achondroplasia	27.1	29.3		I
7	Motor weakness	24.9	17.3	7.6	I
8	Motor delay	27.7	27.3		III
9	Cerebral palsy	29.3	29.3		II
10	Down syndrome	30.6	15.3	15.3	I
11	Down syndrome	33.0	31.3		I
12	Torticollis	29.1	27.3		I
13	Myelomeningocele	46.6	49.3		II
14	Spastic diplegic cerebral palsy	32.9	27.3	5.6	I
15	Klippel-Trenaunay syndrome	42.0	63.3		I

Table 3.7 ToPP Scores and GMFCS Levels (continued)

16	Myelomeningocele	44.8	39.3	4.7	III
17	Chromosome disorder	25.7	19.3	6.4	III
18	DiGeorge syndrome	42.2	41.3		I
19	Developmental delay	32.7	31.3		I
20	Prader Willi syndrome	32.2	31.3		I
21	Cerebral palsy	38.2	23.3	14.9	I
22	Down syndrome	35.4	17.3	18.1	I
23	Developmental delay	29.0	33.3		I
24	Myelomeningocele	27.0	23.3	3.7	II
25	Marfan's syndrome	30.3	19.3	11	I
26	Mild delayed development	35.5	31.3	4.2	I
27	Myelomeningocele	24.8	11.2	13.6	II
28	Cerebral palsy	61.3	49.3	12	III
29	Decreased white matter, low tone	60.8	55.3	5.5	I
30	Motor delay	27.9	39.3		I
31	Right sided weakness	28.6	25.3	3.3	I
32	Developmental delay, club feet	26.0	25.3		I

Table 3-8 Distribution of GMFCS Levels

Gross Motor Function Classification System	Level I	Level II	Level III
Children with Delays in Pretend Play N=17	12	2	3
Children without Delays in Pretend Play N=15	12	2	1

The mean scores of the children with and without play delays are in Table 3.9.

Table 3.9 Comparison of Group Means

Variable	Children with Play Delay N = 17	Children without Play Delay N = 15	Cohen's d
Age	34.45 months (SD 11.29)	39.2 months (SD 6.66)	-0.51
TOPP Score	25.29 months (SD 12.13)	35.3 months (SD 10.05)	-0.81
Maternal Education	13.76 years (SD 1.99)	15.5 years (SD 1.57)	-0.87
Paternal Education[a]	13.51 (SD 1.76)	14.71 (SD 3.17)	-0.46
Income	2.88 (SD 1.86)	3.47 (1.88)	-0.31
LMS Score	7.12 (SD 2.84)	8.4 (SD 1.84)	-0.51
GLQ	71.41 (SD 6.97)	73.5 (SD 9.29)	-0.25
Total AHEMD Score	14.94 (SD 2.16)	16.06 (SD 2.89)	-0.44

[a]Missing data from 4 fathers, 3 in the delay group and 1 in the no delay group

Children with delays in pretend play tended to be younger, have lower GLQ, LMS and AHEMD scores. Mothers and fathers of children with a delay in pretend play had less education and lower income. Effect sizes, based on Cohen's d, range from medium to large.

A Mann-Whitney U test was used to compare the two groups because not all of the data were normally distributed. Results are in Table 3.10.

Table 3-10. Independent Samples Mann Whitney U Test

Variable	Significance
Age	0.823
Maternal Education	0.014*
Paternal Education	0.125
Income	0.313
GLQ	0.682
ToPP Score	0.002*
LMS Score	0.551
Total AHEMD Score	0.176

Alpha level was set at 0.05 *$p < 0.05$

Regression Analysis

Linear regression is a model to predict the value of one variable from another (Field, 2005). Multiple linear regression is used to predict the value of an outcome, in this case the ToPP score, from several predictors (Field, 2005). Forced entry regression was used for this study. All variables were entered into the model simultaneously. The correlation matrix demonstrated a strong relationship between age and ToPP score. Therefore age was used as a predictor variable in the regression. Maternal education level was used as a predictor variable based on the results of the Mann Whitney U test that the distribution of maternal education was not the same across categories of delay. Two additional predictor variables of interest, the LMS score and the GMFCS levels, were chosen. The LMS scores were significantly positively correlated to the ToPP scores.

A multiple linear regression analysis was performed to determine the best model to predict pretend play scores in children with motor disabilities. Four models were tested based on initial analysis of the data. Model 1 proposed that age alone would predict the maximum amount of variance in the ToPP scores. Model 2 proposed that age and maternal level of education would predict the maximum amount of variance in the ToPP scores. Model 3 proposed that age, maternal level of education, and LMS score would predict the maximum amount of variance in the ToPP scores. Model 4 proposed that age, maternal level of education, LMS score and GMFCS level would predict the maximum amount of variance in the ToPP scores.

The child's age and maternal education level were entered into the regression

equation, followed by the LMS score, and finally the GMFCS level. The contribution of the child's age and maternal level of education was significant, $R^2 = 0.628$, adjusted $R^2 = 0.602$, [$p < 0.001$]. The addition of the LMS scores resulted in $R^2 = 0.646$, adjusted $R^2 = 0.608$, [$p < 0.001$]. The addition of the LMS scores did not improve the model in any meaningful way. There was no change in R^2 with the addition of the motor levels of the GMFCS. Child age and maternal education level were able to account for 60% of the variance in ToPP scores in children with motor disabilities. Less than 1% of the variance is accounted for by the LMS scores. The GMFCS level of motor function did not contribute to the variance. Because age was not normally distributed, a new variable was computed, logAge. The data was transformed and the regression redone. There were no differences in the results when using transformed data.

Table 3.11 Output for Multiple Linear Regressions for ToPP Age Equivalent

Model Summary

Model	R	R^2	Adjusted R^2	SEE	R^2 Change	Sig F Change
1	0.757	0.573	0.558	8.067	0.573	0.000
2	0.793	0.628	0.602	7.654	0.056	0.046
3	0.804	0.646	0.608	7.060	0.018	0.246
4	0.804	0.646	0.594	7.739	0.000	0.925

R = correlation between observed values of the outcome and values predicted by the model
R^2 = proportion of the variance explained by the model
Adjusted R^2 = variance adjusted for chance
SEE = Standard error of the estimate

Coefficients for Model 2

	Unstandardized Coefficients		Standardized Coefficients	T	Significance
	B	Std Error	Beta		
(Constant)	-24.042	11.217			
Age	0.978	0.148	0.750	6.618	0.000
Mat Ed	1.442	0.693	0.236	2.081	0.046

Mat Ed = Maternal Education

Test of Pretend Play $_{(estimate)}$ = Age (0.978) + Mat Ed (1.442) – 24.042 $\pm$ 11

Age alone accounts for 56% of the variance in ToPP scores with maternal level of education explaining an additional 4% of the variance. Both levels of parental education, maternal and paternal were not used in the regression model because these two variables were strongly correlated and would have resulted in multicollinearity. Substituting paternal level of education for maternal education in model 1 did not explain as much of the variance as when the maternal level of education was used in the regression. There was missing data from four fathers in regards to education level which may have contributed to the decrease in the variance.

DISCUSSION

There are many variables that could positively or negatively impact development of pretend play in children with motor disabilities. Each child is unique and when in developmental time a problem arises can make a difference in the developmental outcome. The relationship of age to all variables will be discussed first followed by a discussion of the previously stated hypotheses.

Age

Age was expected to positively correlate with the age-related variables as seen

in the previous reliability studies of the ToPP. Development of play represents a maturation of changing abilities of a child to mentally represent objects and be able to substitute one object for another As a child matures, pretend play becomes more complex which is reflected by increases in age-equivalent scores on the ToPP. Age was positively correlated with the scores on the ToPP, GLQ, LMS, and AHEMD. Language and play have similar developmental trajectories during early childhood and then they diverge. Since the majority of the children in the study were under 3 years of age, the non-verbal version of the ToPP was administered. In this version of the ToPP the child is expected to imitate actions of the examiner as well as substitute one object for another. This version does not require the child to understand or act on verbal directions. Many children were minimally verbal during the testing and some did not vocalize at all during the test session. The original developers of the ToPP wanted to find a way to identify children with possible language deficits earlier than was previously possible by only administering a test of language.

Learning Materials

There was a significant positive correlation between the scores on the ToPP and the LMS scores. The significant positive correlations between age, ToPP scores, and LMS scores reinforce the concept that having appropriate learning materials available in the home supports play development. Bailey and Wolery (1984) recommended that children with disabilities should be able to play with toys. Other studies confirm the importance of learning materials for social and cognitive development (Bradley et al, 1989; DiCarlo & Reid, 2004; Malone & Langone, 1998; McCabe, Jenkins, Mills, Dale, &

Cole, 1999). The LMS scores did not significantly contributed to the variance in the regression for predicting ToPP scores in children in this study. This may have been due to a lack of variability in the LMS scores. As there were two ranges of scores based on whether the infant toddler subscale (0-9) was used or the early childhood subscale (0-13), the LMS scores were converted to Z scores for analysis. There was still a significant positive correlation between LMS scores and ToPP scores Pearson $r= 0.594$ [$p < 0.01$] and between LMS scores and age $r = 0.563$ [$p < 0.01$].

The LMS scores and the AHEMD total scores were also positively correlated. This was to be expected as they both measure similar constructs, the materials in the environment that could affect development. In the case of the AHEMD, the tool focuses primarily on toys in the home that afford opportunities for motor development. The tool also assesses the inside and outside space for opportunities for motor development. None of the homes in the study were found to be below average in their total AHEMD scores. This means that all the homes had sufficient resources to adequately support motor development. However, those materials may not support play development as some children with motor disabilities who had sufficient toys exhibited delays in pretend play. Having resources and utilizing resources are not synonymous. Even though a home may possess the toys and physical space for motor development to occur, if a child's motor abilities limit exploration and engagement with objects and people, pretend play may not develop or not develop completely. The AHEMD total score did not contribute to the regression. The AHEMD data will be further analyzed at a later time.

Income

There was not a significant positive correlation between ToPP scores and income as hypothesized. However, income was significantly correlated with LMS scores and total AHEMD scores. Income may affect the ability of families to provide materials for play and learning. Callahan and Eyberg (2010) found that individual indices of socioeconomic status (SES) such as income explained more of the variance in parenting behavior than a composite measure of SES. In this and other studies income was significantly correlated with both maternal and paternal education levels (Kesiktas, Sucuoglu, Keceli-Kaysili, Akalin, Gul, & Yildirim, 2009; Suter & Miller, 1973).

Education

Scores on the ToPP were significantly positively correlated with maternal education level but not with paternal education. Mothers traditionally have provided more support for early development than fathers. Higher levels of maternal education have previously been shown to correlate with positive developmental status (Fewell et al, 1996; Jackson, et al., 2000; Wang, Wang, & Huang, 2008) and based on the findings in this study maternal level of education correlates with development of pretend play. Callahan and Eyberg (2010) found that maternal education was strongly related to mothers' engaging in prosocial talk with their children which may contribute to the development of pretend play. Findings in this study support that mothers' education level should be considered when planning interventions for children with motor disabilities. Teaching mothers how to play with their children should be part of physical therapy. Play actions should be imitated, encouraged and expanded upon as part of an

intervention and pretend play should be identified as a goal in the physical therapy plan of care.

Only one father in this study had a primary caretaking role in the family. The primary caregivers in the six single parent homes were female. The two males in two of the households were not the father of the child in the study which may have decreased the influence on the child's play ability. Maternal and paternal education levels were correlated with the LMS scores which may indicate that both parents provide learning materials for the child or that both parents recognize the importance of play materials for their child's general development. Neither parent may recognize that by learning to pretend play, the child's language and symbolic thinking are also being fostered.

GMFCS

GMFCS levels were significantly negatively correlated to maternal education level $r_s = 0.401$, [$p<0.05$] and to paternal education level $r_s = 0.327$, [$p< 0.05$]. This finding has not previously been reported in the literature. Children classified at GMFCS level I in this study were more likely to have parents with higher levels of education. The majority of children in the study were at GMFCS level I which means the child walks independently. Despite the lack of significant correlation of GMFCS levels and ToPP scores, 75% of children with GMFCS level III function exhibited delays in pretend play (see Tables 3-7 and 3-8). Children with certain motor disabilities such as cerebral palsy (75%) and myelomeningocele (75%) had an equally high frequency of delays in pretend play despite the fact that some of the children were classified at lower GMFCS levels. The higher frequency of delays in pretend play seen in children with cerebral palsy and

myelomeningocele was contrasted by a lower frequency of delays in pretend play (44.4%) seen in children with delayed development and chromosome disorders. A possible explanation may be that the children in this study with delayed development and some chromosome disorders had milder motor involvement than the children with cerebral palsy and myelomeningocele.

Pfeiffer et al. (2011), the only study in the literature review that assessed pretend play, found that 65% of the children with cerebral palsy had delays in pretend play. The present study found 75% of the children with cerebral palsy to have a delay in pretend play. Pfeiffer et al. further reported that most of the children in their study who performed poorly were at GMFCS level V and all who performed well were at GMFCS levels I – III. In the present study children at GMFCS level III were more likely to exhibit delays in pretend play. Only one child in the Pfeiffer et al study was at GMFCS level III. The higher percentage of children with delays in pretend play in the present study is likely a function of a smaller number of children with cerebral palsy (8) in this sample compared to 20 children in the Pfeiffer et al. study. Children varied across all levels of GMFCS in Pfeiffer et al. but the present study was limited to children at levels I to III.

Chiarello et al. (2014) found that participation of which play is a part varied with the GMFCS levels of young children with cerebral palsy. Children with cerebral palsy at level I participated more ($p<0.01$), followed by levels II and III ($p<0.01$) and level IV and V had the lowest frequency ($p<0.01$). The activity the children were most likely to participate in was indoor play with adults, least likely was organized lessons. Indoor play with children was in the lower half of the item hierarchy.

Summary

Fifty-three percent of children in this study exhibited delays in pretend play. As was expected, children with delays were younger and had lower general language quotients. Mothers' and fathers' education levels of children with delays in pretend play were lower, as was income, LMS scores and AHEMD scores. Age of the child contributed 57 percent of the variance in pretend play age equivalent. Pretend play develops over a span of time which reflects the age of the child. With the addition of maternal level of education 63 percent of the variance is explained. The level of maternal education appears to contribute positively to the development of pretend play in children with motor disabilities but the results of this study cannot support more than that statement. The results do not explain how maternal level of education reinforces play and language development.

The study results intimate that developing pretend play may be even more important for children with motor disabilities than for typically developing children. Those children with certain motor disabilities such as cerebral palsy and myelomeningocele had a higher frequency of delays in pretend play than those children with developmental delay or genetic disorders. Therapists need to be aware that children with certain motor disabilities are at greater risk for not developing pretend play. Therapists should enable mothers to scaffold play to support motor and language development. Therapists can model appropriate behavior during therapy sessions as well as encourage the mother's behavior via coaching. Utilization of older siblings in therapy and home programs can provide another way to model play behavior and

increase play complexity.

Implications for Practice

This study provides support for the use of pretend play to provide a context for movement and to promote participation in everyday life. Play engages the mind and the body by reinforcing experience-related movement. Being able to demonstrate pretend play is a worthy goal for children with motor disabilities who are receiving physical therapy and occupational therapy services because play promotes developmental competence. Play is recognized as a major life area for children by the World Health Organization (2007). As a measure of participation, age-appropriate play should be an expected outcome of rehabilitation services for children with motor disabilities (Chiarello et al, 2014). The Division of Early Childhood (2014) recommends that "practitioners promote the child's cognitive development by observing, interpreting and responding intentionally to the child's exploration, play, and social activity by joining in and expanding on the child's focus, actions and intent."

Physical therapy has long been concerned and focused on movement. Movement is part of cognition. Objects and their placement within the environment drive motor performance (Shephard, 2014). Assessing play provides an additional piece of the diagnostic puzzle and a criterion by which to judge how well a child functions. Play is a vehicle for developmental change because it provides context, opportunity for variability in movement, language, and social enjoyment. Physical therapy Interventions with children should be task specific based on a functional and environmental perspective that is family centered. Our interventions must be part of family routines

not discrete activities that do not represent the child's everyday life (Chiarello et al, 2014).

Correlations between the ToPP and LMS reinforce the importance of the home as a learning environment. Given that the child's age and the mother's education level are non-modifiable variables, play intervention should be focused on the availability and use of learning materials. Son and Morrison (2010) documented changes can occur in the home learning environment as the child within that environment approaches school age. There appears to be a window of opportunity between age 3 and 5 years in which a positive change in the home environment can lead to positive changes in language as was the case in the Son and Morrison (2010) study. The language tool was the same one co-normed with the ToPP (Lewis & Boucher, 1997) so it may be that had Son and Morrison (2010) studied play they may have found a correlation with pretend play.

According to motor cognition theorists (Barsalou, 2010; Jeannerod 2006), movement strategies are said to provide the foundation for social-cognitive development. The motor system provides a child with the ability to develop goal-directed movement, anticipate actions, and develop representations of actions such as looking, reaching, grasping, and moving. Therapist should include play as context for movement; creatively use novel toys that engage the child's ability to pretend and create opportunities for the child with motor disability to engage in self-generated perceptual-motor language experiences.

Limitations of the Study

The age of the children in the study was skewed with the majority of the

participants being under 3 years of age. Most children had mild versus moderate motor disabilities based on their GMFCS level. Seventy-five percent of the children were independently walking which meant that their ability to explore their environment was not necessarily impeded by their gross motor disability. Most children had language abilities less than the age of 3 years, even if their age was 3 years or older, necessitating administration of the non-verbal version of the ToPP, therefore language deficits may or may not have impacted pretend play scores.

The majority of children in the study did not attend day care or preschool. Therefore exposure to play in day care or preschool was not a confounding variable. Of those children who attended day care, the day care centers were rated either a 3 or 4. Four is the highest rating given in Indiana to day care centers. Preschools are not rated in Indiana. A small percentage of children received child care in a private home.

The presence or absence of siblings did not appear to effect whether a child had a delay in pretend play. Twelve of 17 (70%) of children with delays in pretend play had siblings while 12 of 15 (87%) of the children with no delay in pretend play had siblings in the home. Having older siblings in the home could have attenuated a delay in play. Two homes had two children in the study. In both cases, one of the siblings had a delay in pretend play and the other did not. The siblings in both instances had similar diagnoses. In one case the diagnosis was delayed development secondary to exposure to lead paint. In the other case both children had motor delay and stiffness with different GMFCS levels. The sibling with the lower GMFCS level had no play delay while the the sibling with a higher GMFCS level had a play delay.

There may have been a sample bias as this was a convenience sample. Participants willing to engage in the study were involved in a therapeutic relationship of some sort. Mothers had high levels of maternal education with 75% having attended college and beyond with only 25% having a high school education. A little over half of the mothers were employed which means that those mothers not employed may have had more time with their children. Paternal education was fairly equally split with half of the fathers having attended high school or middle school and half having attended or completed college. In all but one instance, the mother was the interviewee for the learning material subscale of the HOME. The sample was limited geographically to southern Indiana which is considered rural with one medium sized city. The HOME may be subject to cultural bias but was the only tool available at the time of the study that encompassed the age range of the study sample.

Because the regression analysis resulted in a statistically significant model, the sample size was sufficient. However, a larger sample with greater variance would increase the generalizability of the results.

Future Research

The present study left unanswered questions such as: Why do some children with motor disabilities exhibit delays in pretend play and others do not? Does the type of motor disability and the degree of severity determine the presence or absence of a delay in pretend play or the amount of the delay? Future research should include a follow-up of all the children in the present study. Longitudinal study of play has been recommended by Lillard et al (2013) to further elucidate its effect on all areas of child

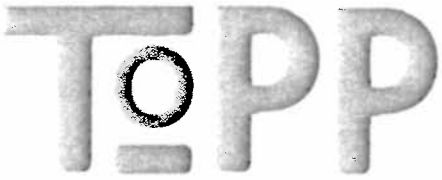
development. Do those who exhibited play delays continue to fall behind or does their play show further development and catch up? Do those children who did not exhibit a delay continue to not exhibit delays as they get older?

Avenues of future research include assessing play in adopted children when English is not the child's first language, promoting use of the ToPP as a reliable way to assess play in children with motor disabilities, and lastly to encourage all pediatric therapists to utilize play as a measure of participation as well as a therapeutic medium to promote motor cognition. Physical therapists need to broaden their interventions into the realm of social play and cognition.

CONCLUSION

Key findings of this study include: 1. Children with mild to moderate motor disabilities are at risk for delays in pretend play; 2. Children with cerebral palsy and myelomeningocele may be at greater risk for delays in pretend play than children with genetic disorders and developmental delay; 3. Learning materials in the home afford children with motor disabilities the opportunity to develop pretend play, and 4. Maternal level of education more than paternal level of education supports pretend play in children with mild to moderate motor disabilities This study provides support for the need to assess pretend play in children with mild to moderate motor disabilities especially those with cerebral palsy and myelomeningocele and to promote pretend play as participation and a means to improve cognitive development.

Test of Pretend Play – Record Form



Name .....

Where tested .....

.....

Address .....

.....

.....

	Day	Month	Year
Date tested			
Date of birth			
Age			

Nonverbal Version
Summary of Scores

Section I Raw Score (max 2)	Section II Raw Score (max 8)	Section III Raw Score (max 12)	Section IV Raw Score (max 12)	Total Raw Score (max 34)	Age equivalent

Verbal Version
Summary of Scores

Section I Raw Score (max 2)	Section II Raw Score (max 8)	Section III Raw Score (max 12)	Section IV Raw Score (max 12)	Total Raw Score (max 34)	Age equivalent

Observation of Free Play
Summary of Scores

Section I Raw Score (max 2)	Section II Raw Score (max 8)	Section III Raw Score (max 12)	Section IV Raw Score (max 12)	Total Raw Score (max 34)	

N.B. **The Nonverbal Version should be used with children up to three years of age, and with older children who have insufficient comprehension to follow the language used in the Verbal Version.**

The Verbal Version should be used with children of three years and above, who have sufficient comprehension to follow the language used in the Verbal Version.

ISBN 0 7491 0605 0

Nonverbal Version

Section I: Self with everyday objects

Item I.1	Reference to an absent object	Max Score	*P/F/ NA	Actual Score
	Bowl and spoon			
Elicit	Encourage play with materials	2		
Model	Eating breakfast	1		
Item I.1 Score (max 2)				

Section I Score (max 2)

Section II: Toy and non-representational materials

Item II.1a	One substitution	Max Score	*P/F/ NA	Actual Score
	Doll and yellow top			
Elicit 1	Encourage play with doll and yellow top	2		
Model	Doll putting on her hat	1		
Elicit 2	Encourage child to produce another example with doll and yellow top	2		
Item II.1a Score (max 2)				

If child achieves the maximum score on Item II.1a, omit Item II.1b, and proceed to Item II.2.

Item II.1b	One substitution	Max Score	*P/F/ NA	Actual Score
	Doll and red cloth			
Elicit 1	Encourage play with doll and cloth	2		
Model	Doll standing on a mat	1		
Elicit 2	Encourage child to produce another example with doll and cloth	2		
Item II.1b Score (max 2)				

Item II.2	Two substitutions	Max Score	*P/F/ NA	Actual Score
	Doll, white counter and black box			
Elicit 1	Encourage play with doll and materials in combination	4		
Model	Doll putting a plate on a table	2		
Elicit 2	Encourage child to produce another example with doll and materials in combination	4		
Item II.2 Score (max 4)				

Item II.3	Three substitutions	Max Score	*P/F/ NA	Actual Score
	Doll, brown stick, round white tub and blue cloth			
Elicit 1	Encourage play with doll and materials in combination	6		
Model	Doll rowing a boat on the water	3		
Elicit 2	Encourage child to produce another example with doll and materials in combination	6		
Item II.3 Score (max 6)				

Item II.4	Four substitutions	Max Score	*P/F/ NA	Actual Score
	Doll, white perspex reel, white board, wooden box and cotton wool			
Elicit 1	Encourage play with doll and materials in combination	8		
Model	Doll going down a hill in a sledge into snow	4		
Elicit 2	Encourage child to produce another example with doll and materials in combination	8		
Item II.4 Score (max 8)				

Section II Score (highest Item Score) (max 8)

* P/F/NA = Passed/Failed/Not Attempted

Section III: Representational toy alone

Item III.1	Reference to an absent object	Max Score	*P/F/ NA	Actual Score
	Teddy			
Model 1	Teddy driving a car	1		
Elicit 1	Encourage child to make teddy pretend that another object or person is present	2		
Model 2	Teddy having a drink	1		
Elicit 2	Encourage child to make teddy pretend that another object or person is present	2		
Item III.1 Score (max 2)				

Item III.2	Property attribution	Max Score	*P/F/ NA	Actual Score
	Teddy			
Model 1	Teddy feeling poorly	1		
Elicit 1	Encourage child to attribute another pretend property to teddy	2		
Model 2	Teddy feeling sad	1		
Elicit 2	Encourage child to attribute another pretend property to teddy	2		
Item III.2 Score (max 2)				

Item III.3	Substitution	Max Score	*P/F/ NA	Actual Score
	Teddy			
Model 1	Teddy being a bridge	1		
Elicit 1	Encourage child to pretend that teddy is something or someone else	2		
Model 2	Teddy being a bird	1		
Elicit 2	Encourage child to pretend that teddy is something or someone else	2		
Item III.3 Score (max 2)				

Item III.4	Scripted play	Max Score	*P/F/ NA	Actual Score
	Teddy			
Model 1	Teddy going shopping (3 related actions)	3		
Elicit 1	Encourage child to produce another script with teddy (3 related actions)	6		
Model 2	Teddy getting ready for bed (3 related actions)	3		
Elicit 2	Encourage child to produce another script with teddy (3 related actions)	6		
Item III.4 Score (max 6)				

Section III Score (add Item Scores) (max 12)

Observations

Section IV: Self alone

Item IV.1	Substitution	Max Score	*P/F/ NA	Actual Score
Model 1	Being a tree	1		
Elicit 1	Encourage child to pretend to be something or someone else	2		
Model 2	Being a rabbit	1		
Elicit 2	Encourage child to pretend to be something or someone else	2		
Item IV.1 Score (max 2)				

Item IV.2	Reference to an absent object	Max Score	*P/F/ NA	Actual Score
Model 1	Eating ice cream	1		
Elicit 1	Encourage child to pretend that another object or person is present	2		
Model 2	Riding a bicycle	1		
Elicit 2	Encourage child to pretend that another object or person is present	2		
Item IV.2 Score (max 2)				

Item IV.3	Property attribution	Max Score	*P/F/ NA	Actual Score
Model 1	Feeling cold	1		
Elicit 1	Encourage child to attribute another pretend property to him/herself	2		
Model 2	Feeling happy	1		
Elicit 2	Encourage child to attribute another pretend property to him/herself	2		
Item IV.3 Score (max 2)				

Item IV.4	Scripted play	Max Score	*P/F/ NA	Actual Score
Model 1	Bathing baby (3 related actions)	3		
Elicit 1	Encourage child to produce another script (3 related actions)	6		
Model 2	Getting up in the morning (3 related actions)	3		
Elicit 2	Encourage child to produce another script (3 related actions)	6		
Item IV.4 Score (max 6)				

Section IV Score (add Item Scores) (max 12)	

Observations

Verbal Version

Section I: Self with everyday objects

Item I.1	Reference to an absent object	Max Score	*P/F/ NA	Actual Score
	Bowl and spoon			
Elicit	What can you do with these?	2		
Instruct	Show me how you eat your breakfast	1		
Item I.1 Score (max 2)				

Section I Score (max 2)

Section II: Toy and non-representational materials

Item II.1a	One substitution	Max Score	*P/F/ NA	Actual Score
	Doll and yellow top			
Elicit 1	What can dolly do with this?	2		
Instruct	Show me how the doll puts on her hat	1		
Elicit 2	What else can dolly do with this?	2		
Item II.1a Score (max 2)				

If child achieves the maximum score on Item II.1a, omit Item II.1b, and proceed to Item II.2.

Item II.1b	One substitution	Max Score	*P/F/ NA	Actual Score
	Doll and red cloth			
Elicit 1	What can dolly do with this?	2		
Instruct	Show me how the doll stands on a mat	1		
Elicit 2	What else can dolly do with this?	2		
Item II.1b Score (max 2)				

Item II.2	Two substitutions	Max Score	*P/F/ NA	Actual Score
	Doll, white counter and black box			
Elicit 1	What can dolly do with these?	4		
Instruct	Show me how the doll puts a plate on a table	2		
Elicit 2	What else can dolly do with these?	4		
Item II.2 Score (max 4)				

Item II.3	Three substitutions	Max Score	*P/F/ NA	Actual Score
	Doll, brown stick, round white tub and blue cloth			
Elicit 1	What can dolly do with these?	6		
Instruct	Show me how the doll rows a boat on the water	3		
Elicit 2	What else can dolly do with these?	6		
Item II.3 Score (max 6)				

Item II.4	Four substitutions	Max Score	*P/F/ NA	Actual Score
	Doll, white perspex reel, white board, wooden box and cotton wool			
Elicit 1	What can dolly do with these?	8		
Instruct	Make the doll go down a hill in a sledge into snow	4		
Elicit 2	What else can dolly do with these?	8		
Item II.4 Score (max 8)				

Section II Score (highest Item Score) (max 8)

Section III: Representational toy alone

Item III.1	Reference to an absent object	Max Score	*P/F/ NA	Actual Score
	Teddy			
Model 1	Teddy driving a car	1		
Elicit 1	What else can teddy do?	2		
Instruct	Show me how teddy has a drink	1		
Elicit 2	What else can teddy do?	2		
Item III.1 Score (max 2)				

Item III.2	Property attribution	Max Score	*P/F/ NA	Actual Score
	Teddy			
Model 1	Teddy feeling poorly	1		
Elicit 1	What else can teddy feel (like)?	2		
Instruct	Show me how teddy feels sad	1		
Elicit 2	What else can teddy feel (like)?	2		
Item III.2 Score (max 2)				

Item III.3	Substitution	Max Score	*P/F/ NA	Actual Score
	Teddy			
Model 1	Teddy being a bridge	1		
Elicit 1	What else can teddy be?	2		
Instruct	Make teddy be a bird	1		
Elicit 2	What else can teddy be?	2		
Item III.3 Score (max 2)				

Item III.4	Scripted play	Max Score	*P/F/ NA	Actual Score
	Teddy			
Model 1	Teddy going shopping (3 related actions)	3		
Elicit 1	What other story can you make up like that for teddy? (3 related actions)	6		
Instruct	Make teddy get ready for bed (3 related actions)	3		
Elicit 2	Can you make up another story for teddy? (3 related actions)	6		
Item III.4 Score (max 6)				

Section III Score (add Item Scores) (max 12)	

Observations

Section IV: Self alone

Item IV.1	Substitution	Max Score	*P/F/ NA	Actual Score
Model 1	Being a tree	1		
Elicit 1	Can you be something else?	2		
Instruct	Show me how you can be a rabbit	1		
Elicit 2	What else could you be?	2		
Item IV.1 Score (max 2)				

Item IV.2	Reference to an absent object	Max Score	*P/F/ NA	Actual Score
Model 1	Eating ice cream	1		
Elicit 1	What else can you do?	2		
Instruct	Show me how you ride a bicycle	1		
Elicit 2	What else could you do?	2		
Item IV.2 Score (max 2)				

Item IV.3	Property attribution	Max Score	*P/F/ NA	Actual Score
Model 1	Feeling cold	1		
Elicit 1	What else could you feel (like)?	2		
Instruct	Show me how you feel happy	1		
Elicit 2	What else could you feel (like)?	2		
Item IV.3 Score (max 2)				

Item IV.4	Scripted play	Max Score	*P/F/ NA	Actual Score
Model 1	Bathing baby (3 related actions)	3		
Elicit 1	What other story can you make up like that? (3 related actions)	6		
Instruct	Show me how you get up in the morning (3 related actions)	3		
Elicit 2	Can you make up another story like that? (3 related actions)	6		
Item IV.4 Score (max 6)				

Section IV Score (add Item Scores) (max 12)

Observations

FLUHARTY–2

Profile/Examiner Record Form

Fluharty Preschool Speech and Language Screening Test — Second Edition

Section I. Identifying Information

Name _____ Female ☐ Male ☐

School _____ Grade _____

Examiner's Name _____

Examiner's Title _____

	Year	Month	Day
Date Tested			
Date of Birth			
Age			

Section II. Record of Scores

Subtests	Raw Score	Summed Raw Score	Age Equivalent	%ile	Std. Score
I. Articulation (Ar)					☐
II. Repeating Sentences (RS)					☐
III. Following Directives and Answering Questions (FD)		RLQ			☐
IV. Describing Actions (DA)					☐
V. Sequencing Events (SE)		ELQ			☐

Section III. Composite Scores

	Sums of Ar	RS	FD	DA	SE	SS	%ile	Quotients
Articulation						☐		
Receptive Language (RLQ)						☐		
Expressive Language (ELQ)						☐		
General Language (GLQ)						☐		

Voice Quality:
☐ sounded normal ☐ recheck may be necessary

Fluency:
☐ sounded normal ☐ recheck may be necessary

Section IV. Profile of Scores

Quotients	Articulation	Receptive Language (RLQ)	Expressive Language (ELQ)	General Language (GLQ)	Quotients	Standard Scores	Articulation (Ar)	Repeating Sentences (RS)	Following Directives and Answering Questions (FD)	Describing Actions (DA)	Sequencing Events (SE)	Standard Scores
150	•	•	•	•	150	20	•	•	•	•	•	20
145	•	•	•	•	145	19	•	•	•	•	•	19
140	•	•	•	•	140	18	•	•	•	•	•	18
135	•	•	•	•	135	17	•	•	•	•	•	17
130	•	•	•	•	130	16	•	•	•	•	•	16
125	•	•	•	•	125	15	•	•	•	•	•	15
120	•	•	•	•	120	14	•	•	•	•	•	14
115	•	•	•	•	115	13	•	•	•	•	•	13
110	•	•	•	•	110	12	•	•	•	•	•	12
105	•	•	•	•	105	11	•	•	•	•	•	11
100	___	___	___	___	100	10	___	___	___	___	___	10
95	•	•	•	•	95	9	•	•	•	•	•	9
90	•	•	•	•	90	8	•	•	•	•	•	8
85	•	•	•	•	85	7	•	•	•	•	•	7
80	•	•	•	•	80	6	•	•	•	•	•	6
75	•	•	•	•	75	5	•	•	•	•	•	5
70	•	•	•	•	70	4	•	•	•	•	•	4
65	•	•	•	•	65	3	•	•	•	•	•	3
60	•	•	•	•	60	2	•	•	•	•	•	2
55	•	•	•	•	55	1	•	•	•	•	•	1

11 12 13 14 15 13 12 11 10 09

Additional copies of this form (#9348) may be purchased from
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800/897-3202, Fax 800/397-7633, www.proedinc.com

Subtest II. Repeating Sentences

DIRECTIONS: Say, "Listen. I am going to say some sentences. After I have finished, I want you to say exactly what I have said. Say the same thing I say. Let's try a sentence. Are you ready?"

Sample A: Say, "The dog barked." If the child responds correctly, say, "Good. You said the same thing I said. Let's try some more." Proceed to Item 1. If the child fails to imitate the item, say, "Listen again and say what I say: The dog barked." If the child is still unable to repeat the sentence, say, "You should have said 'The dog barked.' Let's try another one." Proceed to Sample B.

Sample B: Say, "Listen and say what I say: He runs fast. . . ." If the child responds correctly, say, "Good. Now let's try some more sentences," and proceed to Item 1. However, if the child fails to imitate the second sample item correctly, repeat it, saying, "Listen to me and say what I say: He runs fast." Even if the child is unable to imitate successfully, go on to Item 1. Say, "Listen and say what I say."

Scoring: Correct responses are scored 1 and incorrect responses are scored 0. Disregard articulation and word ending errors as in dialectical differences. Word or phrase omissions, substitutions, and additions are scored as incorrect.

Score	Item
_____	1. He can't reach the coat.
_____	2. My new dog has spots.
_____	3. Her friends walked to the bus stop.
_____	4. If she falls down, she might get hurt.
_____	5. Here is a game that you should play.
_____	6. If you need food, you can buy it from the grocery store.
_____	7. The car, which was red, was parked outside.
_____	8. In the morning, you must get dressed and ready for school.
_____	9. Before washing our hands, we have to turn on the faucet in the sink.
_____	10. The young girls who were playing outside saw the accident.

☐ Total Raw Score

Subtest III. Following Directives and Answering Questions

Part A: Following Directives

DIRECTIONS: Use the set of blocks provided in the kit. Place the blocks in a pile within reach of the child. After each item, return the blocks to the pile in front of the child unless otherwise stated.

Sample A: Say, "I want you to do what I say." Give example item. Say, "Show me one block." If the response is correct, say, "Good, that is one block. Let's do some more." Go to Item 1. If the child responds incorrectly or does not respond, repeat or show the correct response. Say, "Let's try another one." Go to Sample B.

Sample B: Say, "Show me a yellow block." If the response is correct, say, "Good, that is a yellow block. Let's do some more." Go to Item 1. Even if the child responds incorrectly or does not respond, continue with Item 1.

Scoring: The child receives a score of 1 for correctly completing the entire set of directions for an item. Incorrect responses are scored 0.

Score	Item
_____	1. Show me two blue blocks.
_____	2. Take all the white blocks, but not the blue ones.
_____	3. Show me a block that isn't blue.
_____	4. Stack a yellow block on top of a black block.
_____	5. Put one block under the bag and 2 blocks on top of it.
_____	6. Stack 3 yellow blocks over there [point to a spot close to the examinee] and stack 3 white blocks over here [point to a spot close to you]. [Leave the stack standing for next item. If the examinee does not complete this item correctly, construct the necessary stack(s) and continue with Item 7.]
_____	7. Knock down your stack after you knock down mine.
_____	8. Put a yellow block between a blue block and a white block.

Part B: Answering Questions

DIRECTIONS: Say, "I want you to tell me some things about you. Are you ready?"

Scoring: The child receives a score of 1 for an appropriate reply to the question type. Incorrect responses are scored 0.

_____ 9. How many brothers and sisters do you have?

_____ 10. How did you get here today?

_____ 11. When do you go to sleep?

_____ 12. Why should we brush our teeth?

_____ 13. Why wouldn't [the teacher/your mother] want you to run inside?

_____ 14. How can you tell if your shoes are on the wrong feet?

_____ 15. What could you do if you forgot what [the teacher/your mother] said and you needed to remember?

[ ] **Total Raw Score**

Subtest IV. Describing Actions

DIRECTIONS: Say, "Now I am going to show you some pictures and I want you to tell me about the pictures. If I show you a picture of someone reading, you might say, 'She is reading a book' or 'The person is reading a book.' Do you understand?" If no, repeat the directions. "Let's try one." Go to Sample A.

Sample A: Show Sample A (a hand writing), and say, "Tell me about this picture." If the child creates an appropriate sentence, move on to Item 1. If the child cannot create a sentence, prompt with, "Can you tell me about this picture.?" If child is still unable to create a sentence, say, "You might say, 'The person is writing a letter.' Let's try another." Go to Sample B.

Sample B: Show Sample B (a girl skating). Say, "Tell me about this picture." If the child creates an appropriate sentence, move on to Item 1. If the child cannot create a sentence, prompt with, "Can you tell me about this picture?" Even if the child is unable to create a sentence, begin with Item 1 and administer all items in this subtest.

Scoring: The child receives 1 point for a complete sentence with appropriate syntax and verbs. The target verb must be used in the sentence.

Item	Response	Score
1. climbing		
2. drinking		
3. running/jogging		
4. painting		
5. crawling		
6. sweeping/cleaning		
7. singing/talking/speaking		
8. pouring		
9. planting/gardening		
10. swimming		

Total Raw Score ☐

Subtest V. Sequencing Events

DIRECTIONS: Say, "Now I am going to ask you to tell me how to do some things that I might need to know how to do. I will go first. I am going to tell you all the things I need to do to make a peanut butter and jelly sandwich. First, I get two pieces of bread, a knife, the peanut butter, and the jelly. I open the peanut butter and spread some on one piece of bread with the knife. I open the jelly and spread some of it on the other piece of bread with the knife. Then, I put the two pieces of bread together and eat my sandwich. Now it's your turn. Are you ready?"

Scoring: Number of Steps is scored 1 point for three or more steps in proper sequence. Topic Maintained is scored 1 point for appropriate responses.

Number of Steps	Topic Maintained	Item
		1. I want you to tell me all the things I would need to do to wash my hands.
		2. I want you to tell me all the things I would need to do to brush my teeth like you do.
		3. What is your favorite game? Tell me how to play it.
		4. I want you to tell me all the things I would need to do to put on my socks and my shoes in the morning.

_____ + _____ = ☐ **Total Raw Score**

Appendix C

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GMFCS – E & R
Gross Motor Function Classification System Expanded and Revised

(Reference: Dev Med Child Neurol 1997;39:214-223)

INTRODUCTION & USER INSTRUCTIONS

The Gross Motor Function Classification System (GMFCS) for cerebral palsy is based on self-initiated movement, with emphasis on sitting, transfers, and mobility. When defining a five-level classification system, our primary criterion has been that the distinctions between levels must be meaningful in daily life. Distinctions are based on functional limitations, the need for hand-held mobility devices (such as walkers, crutches, or canes) or wheeled mobility, and to a much lesser extent, quality of movement. The distinctions between Levels I and II are not as pronounced as the distinctions between the other levels, particularly for infants less than 2 years of age.

The expanded GMFCS (2007) includes an age band for youth 12 to 18 years of age and emphasizes the concepts inherent in the World Health Organization's International Classification of Functioning, Disability and Health (ICF). We encourage users to be aware of the impact that **environmental** and **personal** factors may have on what children and youth are observed or reported to do. The focus of the GMFCS is on determining which level best represents the **child's or youth's present abilities and limitations in gross motor function**. Emphasis is on usual **performance** in home, school, and community settings (i.e., what they do), rather than what they are known to be able to do at their best (capability). It is therefore important to classify current performance in gross motor function and not to include judgments about the quality of movement or prognosis for improvement.

The title for each level is the method of mobility that is most characteristic of performance after 6 years of age. The descriptions of functional abilities and limitations for each age band are broad and are not intended to describe all aspects of the function of individual children/youth. For example, an infant with hemiplegia who is unable to crawl on his or her hands and knees, but otherwise fits the description of Level I (i.e., can pull to stand and walk), would be classified in Level I. The scale is ordinal, with no intent that the distances between levels be considered equal or that children and youth with cerebral palsy are equally distributed across the five levels. A summary of the distinctions between each pair of levels is provided to assist in determining the level that most closely resembles a child's/youth's current gross motor function.

We recognize that the manifestations of gross motor function are dependent on age, especially during infancy and early childhood. For each level, separate descriptions are provided in several age bands. Children below age 2 should be considered at their corrected age if they were premature. The descriptions for the 6 to 12 year and 12 to18 year age bands reflect the potential impact of environment factors (e.g., distances in school and community) and personal factors (e.g., energy demands and social preferences) on methods of mobility.

An effort has been made to emphasize abilities rather than limitations. Thus, as a general principle, the gross motor function of children and youth who are able to perform the functions described in any particular level will probably be classified at or above that level of function; in contrast, the gross motor function of children and youth who cannot perform the functions of a particular level should be classified below that level of function.

OPERATIONAL DEFINITIONS

Body support walker – A mobility device that supports the pelvis and trunk. The child/youth is physically positioned in the walker by another person.

Hand-held mobility device – Canes, crutches, and anterior and posterior walkers that do not support the trunk during walking.

Physical assistance – Another person manually assists the child/youth to move.

Powered mobility – The child/youth actively controls the joystick or electrical switch that enables independent mobility. The mobility base may be a wheelchair, scooter or other type of powered mobility device.

Self-propels manual wheelchair – The child/youth actively uses arms and hands or feet to propel the wheels and move.

Transported – A person manually pushes a mobility device (e.g., wheelchair, stroller, or pram) to move the child/youth from one place to another.

Walks – Unless otherwise specified indicates no physical assistance from another person or any use of a hand-held mobility device. An orthosis (i.e., brace or splint) may be worn.

Wheeled mobility – Refers to any type of device with wheels that enables movement (e.g., stroller, manual wheelchair, or powered wheelchair).

GENERAL HEADINGS FOR EACH LEVEL

LEVEL I	-	Walks without Limitations
LEVEL II	-	Walks with Limitations
LEVEL III	-	Walks Using a Hand-Held Mobility Device
LEVEL IV	-	Self-Mobility with Limitations; May Use Powered Mobility
LEVEL V	-	Transported in a Manual Wheelchair

DISTINCTIONS BETWEEN LEVELS

Distinctions Between Levels I and II - Compared with children and youth in Level I, children and youth in Level II have limitations walking long distances and balancing; may need a hand-held mobility device when first learning to walk; may use wheeled mobility when traveling long distances outdoors and in the community; require the use of a railing to walk up and down stairs; and are not as capable of running and jumping.

Distinctions Between Levels II and III - Children and youth in Level II are capable of walking without a hand-held mobility device after age 4 (although they may choose to use one at times). Children and youth in Level III need a hand-held mobility device to walk indoors and use wheeled mobility outdoors and in the community.

Distinctions Between Levels III and IV - Children and youth in Level III sit on their own or require at most limited external support to sit, are more independent in standing transfers, and walk with a hand-held mobility device. Children and youth in Level IV function in sitting (usually supported) but self-mobility is limited. Children and youth in Level IV are more likely to be transported in a manual wheelchair or use powered mobility.

Distinctions Between Levels IV and V - Children and youth in Level V have severe limitations in head and trunk control and require extensive assisted technology and physical assistance. Self-mobility is achieved only if the child/youth can learn how to operate a powered wheelchair.

Gross Motor Function Classification System – Expanded and Revised (GMFCS – E & R)

BEFORE 2ND BIRTHDAY

LEVEL I: Infants move in and out of sitting and floor sit with both hands free to manipulate objects. Infants crawl on hands and knees, pull to stand and take steps holding on to furniture. Infants walk between 18 months and 2 years of age without the need for any assistive mobility device.

LEVEL II: Infants maintain floor sitting but may need to use their hands for support to maintain balance. Infants creep on their stomach or crawl on hands and knees. Infants may pull to stand and take steps holding on to furniture.

LEVEL III: Infants maintain floor sitting when the low back is supported. Infants roll and creep forward on their stomachs.

LEVEL IV: Infants have head control but trunk support is required for floor sitting. Infants can roll to supine and may roll to prone.

LEVEL V: Physical impairments limit voluntary control of movement. Infants are unable to maintain antigravity head and trunk postures in prone and sitting. Infants require adult assistance to roll.

BETWEEN 2ND AND 4TH BIRTHDAY

LEVEL I: Children floor sit with both hands free to manipulate objects. Movements in and out of floor sitting and standing are performed without adult assistance. Children walk as the preferred method of mobility without the need for any assistive mobility device.

LEVEL II: Children floor sit but may have difficulty with balance when both hands are free to manipulate objects. Movements in and out of sitting are performed without adult assistance. Children pull to stand on a stable surface. Children crawl on hands and knees with a reciprocal pattern, cruise holding onto furniture and walk using an assistive mobility device as preferred methods of mobility.

LEVEL III: Children maintain floor sitting often by "W-sitting" (sitting between flexed and internally rotated hips and knees) and may require adult assistance to assume sitting. Children creep on their stomach or crawl on hands and knees (often without reciprocal leg movements) as their primary methods of self-mobility. Children may pull to stand on a stable surface and cruise short distances. Children may walk short distances indoors using a hand-held mobility device (walker) and adult assistance for steering and turning.

LEVEL IV: Children floor sit when placed, but are unable to maintain alignment and balance without use of their hands for support. Children frequently require adaptive equipment for sitting and standing. Self-mobility for short distances (within a room) is achieved through rolling, creeping on stomach, or crawling on hands and knees without reciprocal leg movement.

LEVEL V: Physical impairments restrict voluntary control of movement and the ability to maintain antigravity head and trunk postures. All areas of motor function are limited. Functional limitations in sitting and standing are not fully compensated for through the use of adaptive equipment and assistive technology. At Level V, children have no means of independent movement and are transported. Some children achieve self-mobility using a powered wheelchair with extensive adaptations.

BETWEEN 4TH AND 6TH BIRTHDAY

LEVEL I: Children get into and out of, and sit in, a chair without the need for hand support. Children move from the floor and from chair sitting to standing without the need for objects for support. Children walk indoors and outdoors, and climb stairs. Emerging ability to run and jump.

LEVEL II: Children sit in a chair with both hands free to manipulate objects. Children move from the floor to standing and from chair sitting to standing but often require a stable surface to push or pull up on with their arms. Children walk without the need for a hand-held mobility device indoors and for short distances on level surfaces outdoors. Children climb stairs holding onto a railing but are unable to run or jump.

LEVEL III: Children sit on a regular chair but may require pelvic or trunk support to maximize hand function. Children move in and out of chair sitting using a stable surface to push on or pull up with their arms. Children walk with a hand-held mobility device on level surfaces and climb stairs with assistance from an adult. Children frequently are transported when traveling for long distances or outdoors on uneven terrain.

LEVEL IV: Children sit on a chair but need adaptive seating for trunk control and to maximize hand function. Children move in and out of chair sitting with assistance from an adult or a stable surface to push or pull up on with their arms. Children may at best walk short distances with a walker and adult supervision but have difficulty turning and maintaining balance on uneven surfaces. Children are transported in the community. Children may achieve self-mobility using a powered wheelchair.

LEVEL V: Physical impairments restrict voluntary control of movement and the ability to maintain antigravity head and trunk postures. All areas of motor function are limited. Functional limitations in sitting and standing are not fully compensated for through the use of adaptive equipment and assistive technology. At Level V, children have no means of independent movement and are transported. Some children achieve self-mobility using a powered wheelchair with extensive adaptations.

Disability-Adapted Infant/Toddler HOME (Developmental Delay)
Bettye M. Caldwell and Robert H. Bradley
Summary Sheet

Family name _____ Date _____ Visitor _____

Address _____ Phone _____

Child's name _____ Birth date _____ Age ____ Sex ____

Interviewee _____ If other than parent, relationship to child _____

Family composition _____
(persons living in household, including sex and age of children)

Family ethnicity _____ Language spoken _____ Maternal education _____ Paternal education _____

Is mother employed? _____ Type of work when employed? _____ Hrs/wk _____

Is father employed? _____ Type of work when employed? _____ Hrs/wk _____

Current child care arrangements _____

Summarize past year's arrangements _____

Other person(s) present during visit _____

Notes _____

_____

SUMMARY

Subscale	Possible Score	Median	Actual Score	Comments
I. RESPONSIVITY	12	10		
II. ACCEPTANCE	9	8		
III. ORGANIZATION	6	5		
IV. LEARNING MATERIALS	9	6		
V. INVOLVEMENT	12	8		
VI. VARIETY	5	4		
TOTAL SCORE	53	39		

Disability Adapted IT-HOME (Developmental Delay) Record Form

Place a plus (+) or minus (-) in the box alongside each item depending on whether the behavior is observed during the visit, or if the Parent reports that the conditions or events are characteristic of the home environment. Enter the subtotals and the total on the Summary Sheet. Items modified are italicized; items added are bolded. **Observation (O), Either (E), or Interview (I) is indicated for each item.** Caldwell & Bradley, Copyright 2003.

I. RESPONSIVITY		23. Child is taken regularly to doctor's office or clinic. **I**	
1. Parent permits child to engage in "messy" play. **I**		24. Child has a special place for toys and treasures. **E**	
2. *Parent spontaneously communicates with child at least 5 times during visit, excluding scolding.* **O**		25. Child's play environment is safe. **O**	
3. Parent responds verbally to child's vocalizations or verbalizations. **O**		**IV. LEARNING MATERIALS**	
4. Parent tells child name of object or person during visit. **O**		26. Muscle activity toys or equipment. **E**	
5. Parent's speech is distinct, clear, & audible. **O**		27. Push or pull toy. **E**	
6. Parent initiates verbal interchanges with Visitor. **O**		28. Stroller or walker, kiddie car, scooter, or tricycle. **E**	
7. Parent converses freely and easily. **O**		29. Cuddly toy or role-playing toys. **E**	
8. Parent spontaneously praises child at least twice. **O**		30. Learning facilitators—mobile, table and chair, high chair, play pen. **E**	
9. Parent's voice conveys positive feelings toward child. **O**		31. Simple eye-hand coordination toys. **E**	
10. Parent caresses or kisses child at least once.		32. Complex eye-hand coordination toys. **E**	
11. Parent responds positively to praise of child offered by Visitor. **O**		33. Toys for literature and music. **E**	
11a. Parent facilitates communication between Visitor and child. O		34. Parent provides toys for child to play with during visit. **O**	
II. ACCEPTANCE		**V. INVOLVEMENT**	
12. No more than 1 instance of physical punishment during past week. **I**		35. Parent talks to child while doing house hold work. **I**	
13. Family has a pet. **I**		36. Parent consciously encourages developmental advance. **I**	
14. Parent does not shout at child. **O**		37. Parent invests maturing toys with value via personal attention. **I**	
15. Parent does not express overt annoyance with or hostility to child. **O**		38. Parent structures child's play periods. **I**	
16. Parent neither slaps nor spanks child during visit. **O**		**38a. Parent teaches child how to give and receive affection, approval, and other positive affective responses. I**	
17. Parent does not scold or criticize child during visit. **O**		**38b. Parent communicates at least once a month with schools and/or service agencies about child's progress. I**	
18. Parent does not interfere with or restrict child more than 3 times during visit. **O**		**38c. Someone plays with child at least 25% of the time the child is awake. I**	
19. At least 10 books are present and visible. **E**		**38d. Parent spends some time each day helping the child to learn to communicate. I**	
19a. Child is not confined to play pen or jump chair during most of visit. O		39. Parent provides toys that challenge child to develop new skills. **E**	
III. ORGANIZATION		**39a. Parent provides toys, decorations, materials that provide passive stimulation. E**	
20. Child care, if used, is provided by one of 3 regular substitutes. **I**		40. Parent keeps child in visual range, looks at often. **O**	
21. *Someone takes child to grocery store at least once a week and orients child to the store experience.* **I**		**40a. Parent physically interacts with child at east 3 times during visit (not negative). O**	
22. Child gets out of house at least 4 times a week. **I**			

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Disability-Adapted Early Childhood HOME (Developmental Delay)
Bettye M. Caldwell and Robert H. Bradley
Summary Sheet

Family name _____ Date _____ Visitor _____

Address _____ Phone _____

Child's name _____ Birth date _____ Age _____ Sex _____

Interviewee _____ If other than parent, relationship to child _____

Family composition _____
(persons living in household, including sex and age of children)

Family ethnicity _____ Language spoken _____ Maternal education _____ Paternal education _____

Is mother employed? _____ Type of work when employed? _____ Hrs/wk _____

Is father employed? _____ Type of work when employed? _____ Hrs/wk _____

Current child care arrangements _____

Summarize past year's arrangements _____

Other person(s) present during visit _____

SUMMARY

Subscale	Possible Score	Median	Actual Score	Comments
I. LEARNING MATERIALS	13	7		
II. LANGUAGE STIMULATION	9	7		
III. PHYSICAL ENVIRONMENT	7	6		
IV. RESPONSIVITY	9	6		
V. ACADEMIC STIMULATION	6	4		
VI. MODELING	7	6		
VII. VARIETY	10	7		
VIII. ACCEPTANCE	4	4		
TOTAL SCORE	65	43		

Disability-Adapted Early Childhood HOME Record Form (Developmental Delay)

Place a plus (+) or minus (-) in the box alongside each item depending on whether the behavior is observed during the visit, or if the Parent reports that the conditions or events are characteristic of the home environment. Enter the subtotals and the total on the Summary Sheet. Modified items are italicized; added items are in bold type. **Observation (O), Either (E), or Interview (I) is indicated for each item.** Caldwell & Bradley Copyright 2003.

I. LEARNING MATERIALS		18. Parent's voice conveys positive feeling about child. **O**	
1. Child has toys which teach colors, sizes, and shapes. **E**		**18a. Parent facilitates communication between Visitor and child. O**	
2. Child has 3 or more puzzles. **E**		**III. PHYSICAL ENVIRONMENT**	
3. Child has a record, tape, or CD player and at least 5 children's records, tapes, or CD's. **E**		19. Building appears safe and free of hazards. **O**	
4. Child has toys or games permitting free expression. **E**		20. Outside play environment appears safe. **O**	
5. Child has toys or games requiring refined movements. **E**		21. Interior of home or apartment is not dark or perceptually monotonous. **O**	
6. Child has toys or games, which help teach numbers. **E**		22. Neighborhood is aesthetically pleasing. **O**	
7. Child has at least 10 children's books or story tapes, CDs. **E**		23. House has 100 square feet of living space per person. **O**	
8. At least 10 books are visible in the apartment or home. **E**		24. Rooms are not overcrowded with furniture. **O**	
9. Family buys and reads a daily newspaper. **I**		25. House is reasonably clean and minimally cluttered. **O**	
10. Family subscribes to at least one magazine. **I**		**IV. RESPONSIVITY**	
11. Child is encouraged to learn shapes. **I**		26. Parent holds child close 10-15 minutes per day. **I**	
11a. Child has toys, decorations, materials that provide passive stimulation. E		**26a. Parent teaches child how to give and receive affection, approval, and other positive affective responses. I**	
11b. Parent communicates at least once a month with schools and/or service agencies about child's progress. I		*27. Parent converses with child at least five times during visit.* **O**	
II. LANGUAGE STIMULATION		28. Parent answers child's questions or requests verbally. **O**	
12. Child has toys that help teach names of animals. **E**		29. Parent usually responds verbally to child's speech. **O**	
13. Child is encouraged to learn the alphabet. **I**		30. Parent praises child's qualities twice during visit. **O**	
13a. Parent spends some time at least 3 days a week helping child learn to communicate. I		31. Parent caresses, kisses, or cuddles child during visit. **O**	
14. Parent teaches child simple verbal manners (please, thank you, I'm sorry). **I**		32. Parent helps child demonstrate some achievement during visit. **O**	
15. Parent encourages child to talk and takes time to listen.		**V. ACADEMIC STIMULATION**	
16. Child is permitted choice in breakfast or lunch menu. **I**		33. Child is encouraged to learn colors. **I**	
17. Parent uses correct grammar and pronunciation. **O**		34. Child is encouraged to learn patterned speech. **I**	

35. Child is encouraged to learn spatial relationships. **I**		*44. Child is taken on outing by a family member at least every week.* **I**	
36. Child is encouraged to learn numbers.		45. Child has been on a trip more than 50 miles during past year. **I**	
37. Child is encouraged to learn to read a few words. **I**		46. Child has been taken to a museum during past year. **I**	
37a. Child is encouraged to develop social skills needed in school settings. I		47. Parent encourages child to put away toys without help. **I**	
VI. MODELING		48. Child eats at least one meal on most days with mother and father. **I**	
38. Some delay of food gratification is expected. **I**		49. Parent lets child choose certain favorite food products or brands at grocery store. **I**	
39. TV is used judiciously. **I**		50. Parent uses complex sentence structure and vocabulary. **O**	
40. Child can express negative feelings without harsh reprisal. **I**		51. Child's art work is displayed some place in house. **O**	
41a. Parent provides instruction and encouragement for child to establish appropriate play skills and interactive skills. I		**51a. Child is not confined to play pen or jump chair during most of visit. O**	
41b. Parent provides instruction and encouragement for child to learn self-care. I		**VIII. ACCEPTANCE**	
42. Parent introduces Visitor to child. **O**		52. No more than one instance of physical punishment occurred during the past week. **I**	
42a. Parent physically interacts with child at least three times during visit. O		53. Parent does not scold or yell at or derogate child more than once. **O**	
VII. VARIETY		54. Parent does not use physical restraint during visit. **O**	
43. Child has real or toy musical instrument. **E**		55. Parent neither slaps nor spanks child during visit. **O**	
TOTALS I_____ II_____ III_____ IV_____ V_____ VI_____ VII_____ VIII_____ TOTAL_____			

Appendix F

affordances in the home environment motor development

AHEMD (18-42 months)

Child Characterization

Child's Name: _____ **Code:**

Date:

Male ☐ Female ☐ Birth Date: ____/____/____ Birth Weight: _____ lbs

	Never	Less 6 month	6 to 12 months	More 12 months
How long has your child attended childcare?	☐	☐	☐	☐

Ethnicity: White ☐ Black or African-American ☐ Hispanic or Latino ☐ Asian ☐

American Indian or Alaska Native ☐ Native Hawaiian or other Pacific Islander ☐

Family Characterization

1. How many adults live in the family house?	1 ☐	2 ☐	3 ☐	4 ☐	5 or more ☐
2. How many children live in the family house?	1 ☐	2 ☐	3 ☐	4 ☐	5 or more ☐
3. How many rooms do you have in your house? *(please do not count the bathrooms)*	1 ☐	2 ☐	3 ☐	4 ☐	5 or more ☐
4. How long has your child lived at this house?	Less 6 month ☐	6 to 12 months ☐	More 12 months ☐		
5. What's the child's father's education ?	Elementary School ☐	Middle School ☐	High School ☐	College ☐	Master ☐	PhD ☐
6. What's the child's mother's education ?	Elementary School ☐	Middle School ☐	High School ☐	College ☐	Master ☐	PhD ☐
7. What's the annual household income ?	Under $10,000 ☐	$10,000 to $15,000 ☐	$15,000 to 25,000 ☐	$25,000 to $35,000 ☐	$35,000 to $50,000 ☐	$50,000 and over ☐

Physical space in the home

Please read carefully each question and mark the box respective to your answer (Yes or No)

		YES	NO
8	Outside your house (but associated with it) is there ample space for your child to play or move around freely? *(backyard, front yard, garden, etc)*	☐	☐

If you answered YES please proceed with the next question, if you answered NO please go to question number 15

In the outside space is (are) there:

		YES	NO
9	more than one type of ground texture? *(grass, dirt, concrete, wood, sand, etc).*	☐	☐
10	one or more sloped surfaces? *(varied degrees and types of inclines or gradual slopes and slopes).*	☐	☐
11	any apparatus (man made or natural) that your children can grasp and hang from ?	☐	☐
12	any stairs*? (at least two (2) or more steps)*	☐	☐
13	any apparatus or platform that permits your child to climb on/off and step or jump from. *(It must be about eight-inches or more)*	☐	☐
14	a play area *(playground)* designed for your young children ?	☐	☐

Inside your house is (are) there:

		YES	NO
15.	enough space for your child to play or move around freely?	☐	☐
16.	more than one type of ground texture? *(carpet, wood, tile, linoleum, etc).*	☐	☐
17.	material for your child to fall safely on*? (carpet with padding, one-inch mat,, etc)*	☐	☐
18.	any furniture or apparatus that your children can grasp and hang from safely?	☐	☐
19.	any stairs*? (at least two (2) or more steps)*	☐	☐
20.	any furniture or apparatus that permits your child to climb on/off and step or fall from? *(Examples are sofas, small tables, chair, etc).*	☐	☐
21.	any furniture or apparatus with a platform eight-inches (8") tall or more, the child can use to jump from?	☐	☐
22.	a playroom? *(room used **only** for kids to play)*	☐	☐
23.	a special place for toys that is accessible to the child so that she/he may choose when and with what to play? *(toy bins, drawers, or shelves)*	☐	☐

Daily activities in the home

During the day (but only referring to the time spent in your house):	YES	NO
24. My child plays with other children as a usual and ordinary every day event.	☐	☐
25. I (or my husband/wife) usually have a daily special time for playing with my child.	☐	☐
26. Other adults, rather than parents, regularly play with my child.	☐	☐
27. When playing, my child is always allowed to choose the toys or physical activities by herself / himself.	☐	☐
28. My child usually wears clothes that allow freedom to move and explore.	☐	☐
29. My child is often barefoot in the house.	☐	☐
30. I (or my husband/wife) usually try to encourage my child to reach and grasp objects.	☐	☐
31. I (or my husband/wife) usually try to engage my child in movements, games or actions in order to teach her/him parts of the body.	☐	☐
32. I (or my husband/wife) regularly try to teach my child movement or action words as "stop", "run", "walk", "crawl", etc.	☐	☐

On a typical day, how would you describe the amount of awake time your child spends in each of the situations below? *(Read carefully each question and mark the box respective to your answer)*

33. Carried in adult arms, attached to caregiver's body or in some carrying device.

No time ☐ *Very little time* ☐ *Some time* ☐ *A long time* ☐

34. In a seating device (high chair, stroller, car seat, sofa, or any other type of seating devices)

No time ☐ *Very little time* ☐ *Some time* ☐ *A long time* ☐

35. In a Playpen or some other similar equipment.

No time ☐ *Very little time* ☐ *Some time* ☐ *A long time* ☐

36. On the bed or crib (while awake).

No time ☐ *Very little time* ☐ *Some time* ☐ *A long time* ☐

37. Restrained to a specific space in the floor

No time ☐ *Very little time* ☐ *Some time* ☐ *A long time* ☐

38. Free to move in any space of the house

No time ☐ *Very little time* ☐ *Some time* ☐ *A long time* ☐

39. How do you consider the living space inside your house?

Very small ☐ *Reasonable, moderate* ☐ *Small* ☐ *Ample, Big* ☐

Play materials in the home

On each toy group listed below please check the box for the number of toys you have in your house. Please read carefully each group general descriptions for deciding if you have this type of toy in your house.

Figures are only examples to help you better understand the description. You do not need to have the exact toy represented to count it in the group. ***Similar toys should be counted***

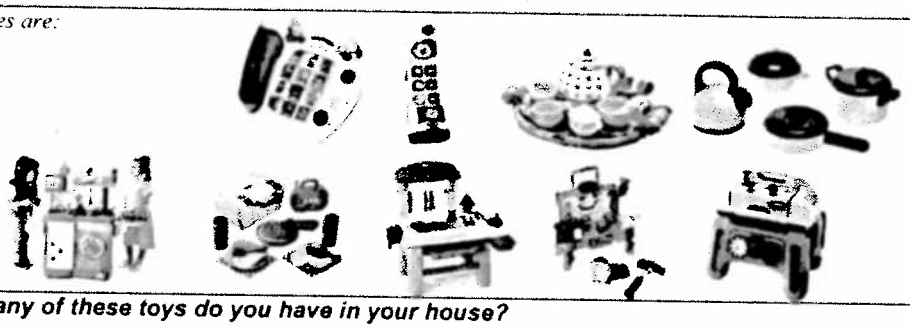
40	Stuffed toys
Examples are: 	
How many of these toys do you have in your house?	
None ☐ One ☐ Two ☐ Three ☐ Four ☐ Five ☐ More than 5 ☐	

41	Dolls and other play figures and respective equipment.
Examples are: 	
How many of these toys do you have in your house?	
None ☐ One ☐ Two ☐ Three ☐ Four ☐ Five ☐ More than 5 ☐	

42	All kind of puppets (small hand puppets)
Examples are: 	
How many of these toys do you have in your house?	
None ☐ One ☐ Two ☐ Three ☐ Four ☐ Five ☐ More than 5 ☐	

43. House equipment, telephone, cooking play material, play tools, and other play materials that simulate adult home activities.

Examples are:



How many of these toys do you have in your house?

None ☐ *One* ☐ *Two* ☐ *Three* ☐ *Four* ☐ *Five* ☐ *More than 5* ☐

44 Vehicles, animals or other toys to be pushed and rolled

Examples are:

How many of these toys do you have in your house?

None ☐ *One* ☐ *Two* ☐ *Three* ☐ *Four* ☐ *Five* ☐ *More than 5* ☐

45. Familiar play scenes (farm, doll house, airport, garage, etc) with people/animal figures, vehicles, and simple supported material

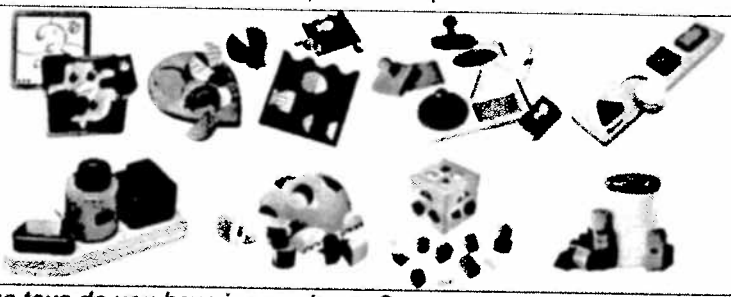
Examples are:

How many of these toys do you have in your house?

None ☐ *One* ☐ *Two* ☐ *Three* ☐ *Four* ☐ *Five* ☐ *More than 5* ☐

46 Puzzles (4-5 pieces) and Shape sorters

Examples are:



How many of these toys do you have in your house?

None ☐ *One* ☐ *Two* ☐ *Three* ☐ *Four* ☐ *Five* ☐ *More than 5* ☐

47 Stacking (6-12 pieces) and Nesting toys

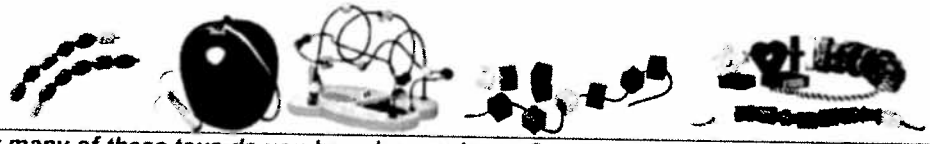
Examples are:

How many of these toys do you have in your house?

None ☐ *One* ☐ *Two* ☐ *Three* ☐ *Four* ☐ *Five* ☐ *More than 5* ☐

48 Lacing cubes or boards and large colored beads

Examples are:



How many of these toys do you have in your house?

None ☐ *One* ☐ *Two* ☐ *Three* ☐ *Four* ☐ *Five* ☐ *More than 5* ☐

49 Peg boards

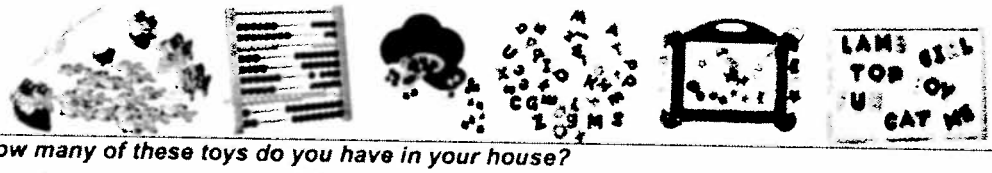
Examples are:

How many of these toys do you have in your house?

None ☐ *One* ☐ *Two* ☐ *Three* ☐ *Four* ☐ *Five* ☐ *More than 5* ☐

50. Simple matching toys, Simple number counting toys, Magnetic boards w/ shapes, animals, letters, Color forms.

Examples are:



How many of these toys do you have in your house?

None ☐ *One* ☐ *Two* ☐ *Three* ☐ *Four* ☐ *Five* ☐ *More than 5* ☐

51 Pop-up-toys and Jack-in-the-box toys.

Examples are:

How many of these toys do you have in your house?

None ☐ *One* ☐ *Two* ☐ *Three* ☐ *Four* ☐ *Five* ☐ *More than 5* ☐

52 Multi-activities tables and apparatus.

Examples are:

How many of these toys do you have in your house?

None ☐ *One* ☐ *Two* ☐ *Three* ☐ *Four* ☐ *Five* ☐ *More than 5* ☐

53 Small Blocks, Lego type bricks, small play construction sets.

Examples are:

How many of these toys do you have in your house?

None ☐ *One* ☐ *Two* ☐ *Three* ☐ *Four* ☐ *Five* ☐ *More than 5* ☐

54 Large plastic bricks to put together on construction settings

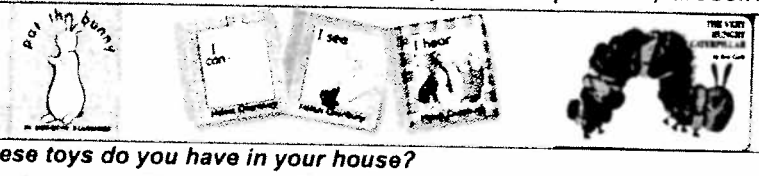
Examples are:

How many of these toys do you have in your house?

None ☐ *One* ☐ *Two* ☐ *Three* ☐ *Four* ☐ *Five* ☐ *More than 5* ☐

55. Books (picture, stories with repetition, pop-up, hidden pictures, dressing, etc)

Examples are:



How many of these toys do you have in your house?

None ☐ *One* ☐ *Two* ☐ *Three* ☐ *Four* ☐ *Five* ☐ *More than 5* ☐

56. Sand boxes, Sand play toys, Water play toys (floating, funnels, colanders, containers, etc)

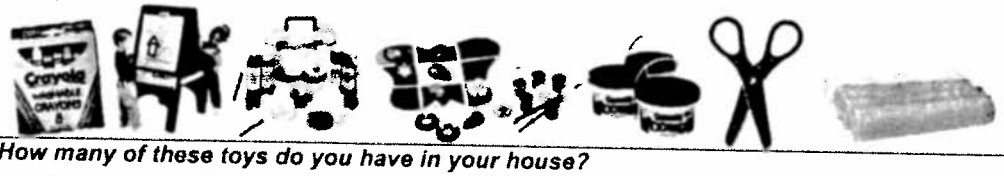
Examples are:

How many of these toys do you have in your house?

None ☐ *One* ☐ *Two* ☐ *Three* ☐ *Four* ☐ *Five* ☐ *More than 5* ☐

57. Materials for designing and coloring: Large crayons, Large Paper, Non-toxic paints (finger, tempera) and short handled brushes w/ blunt ends, Clay or dough, Large, sturdy markers, Blunt-end scissors, Large Chalk

Examples are:



How many of these toys do you have in your house?

None ☐ *One* ☐ *Two* ☐ *Three* ☐ *Four* ☐ *Five* ☐ *More than 5* ☐

58. Simple games, Simple matching and lotto material, Color, picture dominoes, Board games based on chance *(only a few large pieces)*

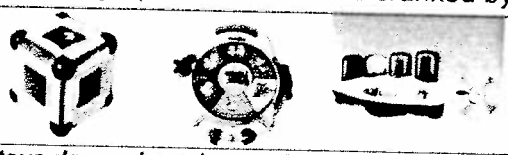
Examples are:

How many of these toys do you have in your house?

None ☐ *One* ☐ *Two* ☐ *Three* ☐ *Four* ☐ *Five* ☐ *More than 5* ☐

59 Musical toys (music box – hand-cranked by child)

Examples are:



How many of these toys do you have in your house?

None ☐ *One* ☐ *Two* ☐ *Three* ☐ *Four* ☐ *Five* ☐ *More than 5* ☐

60. Musical materials, All rhythm instruments (bells, rattles, cymbals, drums, triangle, rhythm stick, xylophones), Horns and whistles

Examples are:

How many of these toys do you have in your house?

None ☐ *One* ☐ *Two* ☐ *Three* ☐ *Four* ☐ *Five* ☐ *More than 5* ☐

61. Play materials used for gross movements with the arm and legs (throwing, catching, kicking, rebounding, striking, etc). Balls of different sizes and colors, Bats, Baseball Gloves, Throwing Targets, etc.

Examples are:

How many of these toys do you have in your house?

None ☐ *One* ☐ *Two* ☐ *Three* ☐ *Four* ☐ *Five* ☐ *More than 5* ☐

62. Play materials used with upright locomotion. Examples are Pull or push toys, Little horses to ride on, Scooters, etc

Examples are:

How many of these toys do you have in your house?

None ☐ *One* ☐ *Two* ☐ *Three* ☐ *Four* ☐ *Five* ☐ *More than 5* ☐

63. Play materials used for gross movement exploration (sliding, creeping, climbing, rolling, etc). Examples are Slides, Stairs, Tunnels, Climbing apparatus, Exercise mattresses, Pools, Parachutes, etc.

Examples are:

How many of these toys do you have in your house?

None ☐ *One* ☐ *Two* ☐ *Three* ☐ *Four* ☐ *Five* ☐ *More than 5* ☐

64. Auto propelled play materials used for riding on, all types of ride-on toys (propelled by bouncing or pushing) and tricycles.

Examples are:

How many of these toys do you have in your house?

None ☐ One ☐ Two ☐ Three ☐ Four ☐ Five ☐ More than 5 ☐

65 Swings, rocking and twisting toys.

Examples are:

How many of these toys do you have in your house?

None ☐ One ☐ Two ☐ Three ☐ Four ☐ Five ☐ More than 5 ☐

66. Mirror (full-length) that can be used by the children in their motor activities.

Examples are:

How many of these toys do you have in your house?

None ☐ One ☐ Two ☐ Three ☐ Four ☐ Five ☐ More than 5 ☐

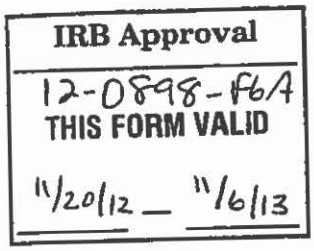
67. Audio equipment (CD or tape Players and children's music CD's or Tapes)

Examples are:

How many of these toys do you have in your house?

None ☐ One ☐ Two ☐ Three ☐ Four ☐ Five ☐ More than 5 ☐

Appendix G



Consent to Participate in a Research Study

Play in Children with Motor Disabilities

WHY ARE YOU BEING INVITED TO TAKE PART IN THIS RESEARCH?

You and your child are being invited to take part in a research study about how children play. Your child is being invited to take part in this research study because he/she is a child with a motor disability between 2 and 5 years, 11 months of age. If you agree to have your child take part in this study, he/she will be one of about 40 children to do so through the University of Kentucky.

WHO IS DOING THE STUDY?

The person in charge of the study is Tink Martin, a doctoral student in the Department of Rehabilitation Sciences at the University of Kentucky, and a professor of Physical Therapy at the University of Evansville. She is being guided in this research by Patrick Kitzman, PT, PhD, of the University of Kentucky. There may be other people on the research team assisting at different times during the study.

WHAT IS THE PURPOSE OF THIS STUDY?

The purpose of the study is to assess the effect of learning materials in the home on the level of pretend play in children with a motor disability. By doing this study we hope to learn how to better assist young children who have a motor disability to more fully engage in age-appropriate play in the home.

ARE THERE REASONS WHY YOU SHOULD NOT TAKE PART IN THIS STUDY?

Your child will not be asked to take part in the study if he/she has emotional difficulties, autism or severe intellectual or physical disability.

WHERE IS THE STUDY GOING TO TAKE PLACE AND HOW LONG WILL IT LAST?

The research procedures will be conducted in your home. The primary investigator will visit your home two times for the study. The first visit will take about an hour. The second visit will take about 30 minutes. The total amount of time you and your child will be asked to volunteer for this study is about 1 1/2 hours over the next 2 months.

During the first visit the primary investigator will assess the child's motor abilities through observation and use a test to screen your child's speech and language. The primary investigator will ask you, the parent, yes and no questions about the home using the Home Observation for Measurement of the Environment (HOME Inventory). The first visit will allow the child to become familiar with the investigator during a short period of free play. The primary investigator will leave a questionnaire for the parent to fill out. During the second visit your child's play behavior will be assessed using the Test of Pretend Play. Pretend play involves imitation of real life activities using objects or toys. Examples of pretend play include talking on a toy telephone or feeding a baby doll. The Test of Pretend Play will be videotaped to allow the primary investigator to fully engage the child in play. The primary investigator will collect the questionnaire at the

end of the second visit. When the child completes the test of pretend play and the questionnaire is returned to the primary investigator the child will receive a $10 gift card.

WHAT ARE THE POSSIBLE RISKS AND DISCOMFORTS?

There are minimal risks to participating in this study. Your child will be asked to repeat sentences, respond to requests using blocks, tell what is happening in a set of pictures, follow simple directions and describe actions and a series of events. Your child will be observed by the primary investigator while playing with objects (toys) from the test of play. Every effort will be made to minimize any possible safety threats such as throwing, hitting him/herself or eating the toys. In addition to the risks listed above, your child may experience a previously unknown risk or side effect.

WILL YOU BENEFIT FROM TAKING PART IN THIS STUDY?

You or your child may benefit from taking part in this study by learning about your child's level of play performance.

DO YOU HAVE TO TAKE PART IN THE STUDY?

If you decide to have your child participate in the study, it should be because you really want to volunteer your child. Your child will not lose any benefits or rights he/she would normally have if you agree to have your child volunteer. Your child can stop at any time during the study and still keep the benefits and rights he/she had before volunteering.

IF YOU DON'T WANT TO TAKE PART IN THE STUDY, ARE THERE OTHER CHOICES?

If you decide not to let your child take part in this study, there are no other choices except not to take part in the study.

WHAT WILL IT COST YOU TO PARTICIPATE?

There is no added cost to having your child participate in this study.

WHO WILL SEE THE INFORMATION THAT YOU GIVE?

We will make every effort to keep private all research records that identify you and your child to the extent allowed by law. All data will be kept in a secure locked cabinet in the primary investigator's office. Data for analysis will be stored in a password protected computer in the primary investigator's office. Redcap™ will be used to keep data secure. The videotapes will be destroyed at the end of the study.

Your information will be combined with information from other children taking part in the study. When we write about the study to share it with other researchers, we will write about the combined information we have gathered. You and your child will not be identified in these written materials. We may publish the results of this study; however, we will keep your name and other identifying information private.

You should know, however, there are some circumstances in which we may have to show your information to other people. For example, the law may require us to show your information to a court or to tell authorities if you report information about a child being abused or if you pose a danger to yourself or someone else.

Officials of the University of Kentucky may look at or copy pertinent portions of record that identify you.

IRB

CAN YOUR TAKING PART IN THE STUDY END EARLY?

If you decide to allow your child to take part in the study, you still have the right to decide at any time that you no longer want your child to participate. Any data collected prior to your decision to leave the study will be destroyed.

WILL YOU RECEIVE ANY REWARDS FOR TAKING PART IN THIS STUDY?

Your child will receive a $10 gift card when the child completes the test of pretend play and the questionnaire is returned to the primary investigator.

WHAT IF YOU HAVE QUESTIONS, SUGGESTIONS, CONCERNS, OR COMPLAINTS

Before you decide to accept this invitation on behalf of your child to take part in the study, please ask any questions that come to mind now. Later, if you have questions, suggestions, concerns, or complaints about the study, you can contact the investigator, Tink Martin, at 812-746-5012 or Patrick Kitzman, PT, PhD at 859-218-0580. If you have any questions about your or your child's rights as a volunteer in this research, contact the staff in the Office of Research Integrity at the University of Kentucky at 859-257-9428 or toll free at 1-866-400-9428. We will give you a signed copy of this consent form to take with you.

WHAT IF NEW INFORMATION IS LEARNED DURING THE STUDY THAT MIGHT AFFECT YOUR DECISION TO LET YOUR CHILD PARTICIPATE?

If the researcher learns of new information in regards to this study, and it might change your willingness to stay in this study, the information will be provided to you. You may be asked to sign a new informed consent form if the information is provided to you after you have joined the study.

WHAT ELSE DO YOU NEED TO KNOW?

The University of Kentucky and the University of Evansville are providing material for this study.

_____

Printed name of the child

_____ _____

Signature of parent/guardian of the child agreeing to take part in the study Date

_____

Printed name of parent/guardian of the child agreeing to take part in the study

_____ _____

Signature of parent signing agreeing to take part in the study Date

_____ _____

Name of [authorized] person obtaining informed consent Date

_____

Signature of Investigator

Confidential

Demographics PCMD

Record ID	_____
Date Consent Signed	_____
Date of Birth	_____
Age in months	_____
Gender	☐ female ☐ male
Ethnicity	☐ hispanic ☐ caucasian ☐ black ☐ asian
Street, City, State, Zip Code	_____
Phone Number	_____
Parent/Guardian	_____
Maternal Education	_____
Paternal Education	_____
Mother's Occupation	_____
Father's Occupation	_____
Siblings	_____
Income	☐ under $ 10,000 ☐ $10,000 to $15,000 ☐ $15,000 to $25,000 ☐ $25,000 to $35,000 ☐ $35,000 to $50,000 ☐ $50,000 and over
Pediatrician/Primary Care Provider	_____
Disability	_____
GMFCS Level	☐ level I ☐ level II ☐ level III
Favorite Toy	_____
Hand Preference	☐ right ☐ left ☐ both (Note asymmetrical involvement)
Therapy	☐ PT ☐ OT ☐ ST ☐ DT
Daycare	☐ Yes ☐ No
Day Care Name	_____

Day Care Level	☐ Level 1 ☐ Level 2 ☐ Level 3 ☐ Level 4 ☐ not rated
Preschool	☐ Yes ☐ No

Data PCMD

Record ID	_____
Fluharty-2 receptive language	☐ less than 3 years ☐ 3 years or older
Fluharty-2 expressive language	☐ less than 3 years ☐ 3 years or older
Fluharty-2 general language quotient	_____
IT Home Inventory	☐ Yes ☐ No
learning materials subscale score	_____
EC Home Inventory	☐ Yes ☐ No
learning material subscale score	_____
Test of Pretend Play age equivalent	_____
Test of Pretend Play observation notes	_____
AHEMD outside space standard score	_____
AHEMD inside space standard score	_____
AHEMD variety of stimuation standard score	_____
AHEMD fine motor toys standard score	_____
AHEMD gross motor toys standard score	_____
Total AHEMD standard score	_____

REFERENCES

Abbott, A., & Bartlett, D. (1999). The relationship between the home environment and early motor development. *Physical & Occupational Therapy in Pediatrics,* 19, 43-57.

Abbott, A., & Bartlett, D. (2000). Infant motor development and equipment use in the home. *Child, Care, and Development*, 27, 295-306.

Abbott, A. L., Bartlett, D. J., Fanning, J. E. K., & Kramer, J. (2000). Infant motor development and aspects of the home environment. *Pediatric Physical Therapy,* 12, 62-67.

Abe, M., & Hanakawa, T. (2009). Functional coupling underlying motor and cognitive functions of the dorsal premotor cortex. *Behavioral Brain Research*, 198, 13-23.

Alpern, G., Boll, T., & Shearer, M. (1984). Developmental Profile II. Los Angeles, CA: Western Psychological Services.

Bailey, D. & Wolery, M. (1984). *Teaching infants and preschoolers with handicaps*. Columbus, OH: Charles E. Merrill.

Baron-Cohen, S. (1987). Autism and symbolic play. *British Journal of Developmental Psychology,* 5, 139-148.

Barsalou, L. W. (2010). Grounded cognition: Past, present, and future. *Topics in Cognitive Science*, 2, 716-724.

Barton, E. E. (2010). Development of a taxonomy of pretend play for children with disabilities. *Infants and Young Children,* 23, 247-261.

Barton, E. E., & Wolery, M. (2008). Teaching pretend play to children with disabilities: A

review of the literature. *Topics in Early Childhood Special Education,* 28, 109-125.

Belsky, J., & Most, R. K. (1981). From exploration to play: A cross-sectional study of infant free play behavior. *Developmental Psychology,* 17, 630-639.

Blanche, E. I. (2008). Play in children with cerebral palsy: Doing with - not doing to. In L. D. Parham & L. S. Fazio, (Eds), *Play in occupational therapy for children*, (2nd ed., pp. 375-394). St. Louis: Mosby.

Boucher, J., & Lewis, V. (1997). PLS-3 (UK). UK adaptation of Zimmerman, I. L., Steiner, V. G., & Pond, R. E., 1991. *Preschool Language Scale,* 3rd edition. San Antonio, TX: The Psychological Corporation.

Bornstein, M. H., Haynes, O. M., O'Reilly, A. W., & Painter, K. M. (1996). Solitary and collaborative pretense play in early childhood: Sources of individual variation in the development of representational competence. *Child Development,* 67, 2910-2929.

Bradley, R. H. (2010). The HOME environment. In M. H. Bornstein, (Ed), *Handbook of cultural developmental science*, (pp. 505-530). New York: Psychology Press.

Bradley, R. H., Caldwell, B. M., Rock, S. L., Ramey, C. T., Barnard, K. E., Gray, C., . . . & Johnson, D. L. (1989). Home environment and cognitive development in the first 3 years of life: A collaborative study involving six sites and three ethnic groups in North America. *Developmental Psychology,* 25, 217-235.

Bradley, R. H., Rock, S. L., Caldwell, B. M., & Brisby, J. A. (1989). Uses of the HOME inventory for families with handicapped children. *American Journal on Mental Retardation*, 94, 313- 330.

Bronfenbrenner, U. (1979). *The ecology of human development: Experiments by nature and design*. Cambridge, MA: Harvard University Press.

Buchanan, M. (2009). The home play of toddlers with disabilities: Contexts and maternal perspectives. *International Journal of Disability, Development and Education,* 56, 263-283.

Byers, J. A. (1998). The biology of human play. *Child Development,* 69, 599-600.

Byers, J. A., & Walker, C. (1995). Refining the motor training hypothesis for the evolution of play. *American Naturalist*, 146, 25-40.

Caldwell, B. M., & Bradley, R. H. (1984). HOME *observation for measurement of the environment.* Little Rock, AR: University of Arkansas at Little Rock.

Caldwell, B. M., & Bradley, R. H. (2003). *HOME inventory and administration manual: Comprehensive edition*. Little Rock, AR: University of Arkansas for Medical Sciences and University of Arkansas at Little Rock.

Callahan, C. L., & Eyberg, S. M. (2010). Relations between parenting behavior and SES in a clinical sample: Validity of SES measures. *Child & Family Behavior Therapy,* 32,125-138.

Casby, M. W. (2003a). The development of play in infants, toddlers, and young children. *Communications Disorders Quarterly, 24*(4), 163-174.

Casby, M. W. (2003b). Developmental assessment of play: A model for early intervention. *Communications Disorders Quarterly,* 24, 175-183.

Charman, T., & Baron-Cohen, S. (1997). Brief report: Prompted pretend play in autism. *Journal of Autism and Developmental Disorders,* 27, 325-332.

Chiarello, L. A., Huntington, A., & Bundy, A. (2006), A comparison of motor behaviors, interaction, and playfulness during mother-child and father-child play with children with motor delay. *Physical & Occupational Therapy in Pediatrics,* 26, 129-151.

Chiarello, L. A., Palisano, R. L., McCoy, S. W., Bartlett, D. J., Wood, A., Chang, H., Kang, L., & Avery, L. (2014). Child engagement in daily life: a measure of participation for young children with cerebral palsy. *Disability and Rehabilitation,* doi:10.3109/09638288.2014.882417.

Chiarello, L. A., Palisano, R. L., Orlin, M. N., Chang, H-J., Begnoche, D., & An M. (2012). Understanding participation of preschool-age children with cerebral palsy. *Journal of Early Intervention*, 34, 3-19.

Chien, C. W., Roger, S., Copley, J., Skorka, K. (2014), Comparative content review of children's participation measures using the international classification of functioning, disability, and health – children and youth. *Archives of Physical Medicine and Rehabilitation,* 95, 141-152.

Childress, D. C. (2011). Play behaviors of parents and their young children with disabilities. *Topics in Early Childhood Special Education*, 31, 112-120.

Diamond, A. (2000). Close interrelation of motor development and cognitive development and of the cerebellum and the prefrontal cortex. *Child Development*, 7, 44-56.

DiCarlo, C. F., & Reid, D. H. (2004). Increasing pretend toy play of toddlers with Disabilities in an inclusive setting. *Journal of Applied Behavioral Analysis,* 37,

197-207.

Division for Early Childhood. (2014). *DEC recommended practices in early intervention/early childhood special education.* Retrieved from htttp://www.dec-sped.org/recommendedpractices.

Dunst, C. J., Hamby, D., Trivette, C. M., Raab, M., & Bruder, M. B. (2002). Young children's participation in everyday family and community activity. *Psychology Reports*, 91, 875-897.

Fein, G. G. (1981). Pretend play in childhood: An integrative review. *Child Development*, 52, 1095-1118.

Fewell, R. R., Casal, S. G., Glick, M. P., Wheeden, C. A., & Spiker D. (1996). Maternal education and maternal responsiveness as predictors of play competence in low birth weight, premature infants: a preliminary report. *Journal of Developmental and Behavioral Pediatrics,* 17, 100-104.

Fewell, R. R., Ogura, T., Notari-Syverson, A., & Wheeden, C. A. (1997). The relationship between play and communication skills in young children with Down syndrome. *Topic in Early Childhood Special Education*, 17, 103-118.

Field, A. (2005). *Discovering statistics using SPSS*, (2nd ed.,). Thousand Oaks, CA: Sage.

Fluharty, N. B. (2001). *Fluharty-2: Fluharty Preschool Speech and Language Screening test*, 2nd edition. Austin, TX: Pro-Ed.

Fox S. E., Levitt, P., & Nelson C. A. (2010). How the timing and quality of early experiences influence the development of brain architecture. *Child Development*, 81, 28-40.

Gabbard, C., Cacola, P., & Rodrigues L. P. (2008). A new inventory for assessing *Affordances in the Home Environment for Motor Development (AHEMD-SR). Early Childhood Education Journal*, 36, 5-9.

Gallese, V., & Rochat, M. (2010). Motor cognition: Role of the motor system in the phylogeny and ontogeny of social cognition and its relevance for the understanding of autism. In P. D. Zelazo, M.Chandler, E. Crone (Eds.), *Developmental social cognitive neuroscience,* (pp 13-41). New York: Psychology Press.

Gibson, E. J. (2002). *Perceiving the affordances: A portrait of two psychologists*. Mahwah, NJ: Erlbaum.

Gibson, J. J. (1979). *An ecological approach to perception*. Boston, MA: Houghton Mifflin.

Goyen, T-A., & Lui, K. (2002). Longitudinal motor development of "apparently normal" high-risk infants at 18 months, 3 and 5 years. *Early Human Development*, 70, 103-115.

Haight, W., & Miller, P. J. (1992). The development of everyday pretend play: A longitudinal study of mothers' participation. *Merrill-Palmer Quarterly,* 38, 331-349.

Harris, P. J., Taylor, R., Thielke, R., Payne, J., Gonzalez, N., & Conde, J G. (2009). Research electronic data capture (REDCap) – A metadata-driven methodology and workflow process for providing translational research informatics support. *Journal of Biomedical Informatics,* 42, 377-381.

Herbert, H., Swank, P., Smith, K., & Landry, S. (2004). Maternal support for play and language across early childhood. *Early Education & Development*, 15, 93-113.

Hestenes, L. L., & Carroll, D. E. (2000). The play interactions of young children with and without disabilities: Individual and environmental influences. *Early Childhood Research Quarterly,* 15, 229-246.

Hill, P. M., & McCune-Nicolich, L. (1981). Pretend play and patterns of cognition in Down's syndrome children. *Child Development*, 52, 611-617.

Howes, C., Guerra, A. W., Fuligni, A., Zucker, E., Obregon N. B., & Spivak, A. (2011). Classroom dimensions predict early peer interaction when children are diverse in ethnicity, race, and home language. *Early Childhood Research Quarterly,* 26, 399-408.

Howes, C., & Matheson, C. C. (1992). Sequences in the development of competent play with peers: social and social pretend play. *Developmental Psychology*, 28, 961-974.

Jackson, A., Brooks-Gunn, J., Huang, C. & Glassman, M. (2000). Single mothers in low-wage jobs: Financial strain, parenting and preschoolers' outcomes. *Child Development,* 71, 1409-1423.

Jain, L. (2008). School outcome in late preterm infants: A cause for concern. *Journal of Pediatrics*, 153, 5-6.

Jarrold, C. (2003). A review of research into pretend play in autism. *Autism*, 7, 379-390.

Jarrold, C., Boucher, J., & Smith, P. (1993). Symbolic play in autism: A review. *Journal of Autism and Developmental Disorders, 23,* 281-307.

Jeannerod M. (2006). *Motor cognition: What actions tell the self.* O*xford:* Oxford University Press.

Jennings, K. D., Connors, R. E., & Stegman, C. E. (1988). Does a physical handicap alter the development of mastery motivation during the preschool years? *Journal of the American Academy of Child Adolescent Psychiatry,* 27, 312-317.

Jordan, R. (2003). Social play and autistic spectrum disorders: A perspective on theory, implications and educational approaches. *Autism,* 7, 347-60.

Kesiktas, A. D., Sucuoglu, M. S., Keceli-Kaysili, B., Akalin, S., Gul, G., & Yildirim, B. (2009). The home environment of young children with and without disabilities. *Infants & Young Children*, 22, 201-210.

Landry, S.H., Copeland, D., Lee, A., & Robinson, S.S. (1990). Goal-directed behavior in children with spina bifida. *Developmental and Behavioral Pediatrics, 11*, 306-311.

Landry, S. H., Robinson, S.S., Copeland, D., & Garner, P.W. (1993). Goal-directed behavior and perception of self-competence in children with spina bifida. *Journal of Pediatric Psychology*, 18, 389-396.

Law, M., King, G., Petrenchik, T., Kertoy, M., & Anaby, D. (2012). The assessment of preschool children's participation: Internal consistency and construct validity. *Physical and Occupational Therapy in Pediatrics*, 32, 272-287.

Leung, G. P. K., Chan, C. C. H., Chung, R. C. K., & Pang, M. Y. C. (2011). Determinants of activity and participation in preschoolers with developmental delay. *Research in Developmental Disabilities*, 32, 289-296.

Lewis, V., & Boucher, J. (1997). *Manual of the Test of Pretend Play*. London: The

Psychological Corporation.

Lewis, V., Boucher, J., & Astell, A. (1992). The assessment of symbolic play in young children: A prototype test. *European Journal of Disorders of Communication,* 27, 231-245.

Lewis, V., Boucher, J., Lupton, L., & Watson, S. (2000). Relationships between symbolic play, functional play, verbal and non-verbal ability in young children. *International Journal of Language & Communication Disorders*, 35, 117-127.

Lifter, K., & Bloom, L. (1989). Object knowledge and the emergence of language. *Infant Behavior and Development,* 12, 395-423.

Lifter, K., Foster-Sanda, S., Arzamarski, C., Briesch, J., & McClure, E. (2011). Overview of play: Its uses and importance in early intervention/early childhood special education. *Infants & Young Children*, 24, 225-245.

Lifter, K., Mason, E. J., & Barton, E. E. (2011). Childrens' play: Where we have been and where we could go. *Journal of Early Intervention*, 33, 281-297.

Lillard, A. (2007). Guided participation: How mothers structure and children understand pretend play. In A. Goncu & S. Gaskins (Eds.), *Play and Development: Evolutionary sociocultural, and functional perspectives,* (pp.131-153). Mahwah, NJ: Lawrence Erlbaum.

Lillard, A. S., & Kavanaugh, R. D. (2014). The contribution of symbolic skills to the development of an explicit theory of mind. *Child Development,* doi: 10.1111/cdev.12227.

Lillard, A. S., Lerner, M. D., Hopkins, E. J., Dore, R. A., Smith, E. D., & Palmquist, C. M. (2013). The impact of pretend play on children's development: a review of the

evidence. *Psychological Bulletin* 139, 1-34.

Lillard, A. S., Nishia, T., Massaro, D., Vaish, A., & Ma, L. (2007). Signs of pretense across age and scenario. *Infancy*, 11, 1-30.

Linder, T. (2008). *Trandsiciplinary play-based instruction,* (2nd ed.). Baltimore, MD: Paul H. Brookes.

Lobo, M. A., Harbourne, R. T., Dusing, S. C., & McCoy, S. W. (2013). Grounding early intervention: Physical therapy cannot just be about motor skills anymore. *Physical Therapy*, 93, 94-103.

Long, D., Bergeron, J., Doyle, S. L., & Gordon, C. Y. (2005). The relationship between frequency of participation in play activities and kindergarten readiness. *Occupational Therapy and Health Care*, 19, 23-42.

Malone, D. M., & Langone, J. (1998). Variability in the play of preschoolers with cognitive delays across different toy sets. *International Journal of Disability, Development, and Education,* 45, 127-142.

Manning, M. M., & Wainwright, L. D. (2010). The role of high level play as a predictor social functioning in autism. *Journal of Autism and Developmental Disorders,* 40, 523-533.

McCabe, J. R. Jenkins, J. R., Mills, P. E., Dale, P. S., & Cole, K. N. (1999). Effects of group composition, materials, and developmental level on play in preschool children with disabilities. *Journal of Early Intervention*, 22, 164-178.

McCune, L. (1985). Play-language relationships and symbolic development. In C. C. Brown, & A. W. Gottfried (Eds.). *Play interactions: The role of toys and parental*

involvement in children's development (pp. 38-45). Skillman, NJ: Johnson & Johnson.

McCune , L. (1995). A normative study of representational play at the transition to language. *Developmental Psychology*, 31, 198-206.

Mead, G. H. (1934). *Mind, self and society.* Chicago, IL: University of Chicago Press.

Mitchell, R. S. (2007). Pretense in animals: The continuing relevance of children's pretense. In A. Goncu & S. Gaskins (Eds.), *Play and development: Evolutionary, sociocultural and functional perspectives, (pp. 51-75*.). Mahwah, NJ: Lawrence Erlbaum.

Najman, J., Bor, W., Morrison, J., Anderson, M., & William, G. (1992). Child development delay and socioeconomic disadvantage in Australia: A longitudinal study. *Social Science Medicine,* 34, 829-835.

Nehring, W. M. (1989). Pretend play in preschoolers with Down syndrome. Dissertation abstract, University of Illinois at Chicago, Health Sciences Center.

Nicolopoulou, A., Barbosa de Sa, A., Hgaz, H., & Brockmeyer, C. (2010). Using the transformative power of play to educate hearts and minds: From Vygotsky to Vivian Paley and beyond. *Mind, Culture, & Activity,* 17, 42-58.

Nielsen, M. (2012). Imitation, pretend play, and childhood: Essential elements in the evolution of human culture? *Journal of Comparative Psychology*, 126, 170-181.

Nielsen, M., & Christie, T. (2008). Adult modelling facilitates young children's generation of novel pretend acts. *Infant and Child Development*, 17, 151-162.

O'Connell, B., & Bretherton, I. (1984). Toddler's play, alone and with mother: The role of

maternal guidance. In I. Bretherton (Ed.), *Symbolic play: The development of social understanding,* (pp. 337-368). Orlando, FL: Academic Press.

Odom, S. L., Zercher, C., Li, S., Marquart, J. M., Sandall, S., & Brown, W. H. (2006). Social acceptance and rejection of preschool children with disabilities: A mixed-method analysis. *Journal of Educational Psychology,* 98, 807-823.

O'Toole, C., & Chiat, S. (2006). Symbolic functioning and language development in children with Down syndrome. *International Journal of Language and Communication Disorders,* 41, 155-171.

Palisano, R. J., Rosenbaum, P., Bartlett, D., & Livingston, M. (2007). GMFCS E & R© CanChild Centre for Childhood Disability Research, McMaster University. Expanded version for children before 2nd birthday to 18th birthday available at: http://motorgrowth.canchild.ca/en/GMFCS/resources/GMFCS-ER.pdf. Accessed 9/2012.

Parten, M. B. (1932). Social participation among preschool children. *Journal of Abnormal Psychology,* 27, 243-269.

Pellegrini, A. D., & Smith, P. K. (1998). Physical activity play: the nature and function of a neglected aspect of play. *Child Development*, 69, 577-598.

Personal Communication. (2011) Communication Disorders Faculty at University of Kentucky, Lexington, KY.

Pfeifer, L. I., Pacciulio, A. M., dos Santos, C. A., dos Santos, J. L., & Stagnitti, K. E. (2011). Pretend play of children with cerebral palsy. *Physical and Occupational Therapy in Pediatrics,* 31, 390-402.

Piaget, J. (1952). *Origins of intelligence*. New York, NY: International Universities Press.

Piaget, J. (1962). *Play, dreams and imitation in childhood*. New York, NY: Norton.

Piek, J. P., Dawson, L., Smith, L. M., & Gasson, N. (2008). The role of early fine and gross motor development on later motor and cognitive ability. *Human Movement Science,* 27, 668-681.

Pitcher J. B., Schneider, L. A., Drysdale, J. L., Ridding, M.C., & Owens, J. A. (2011). Motor system development of the preterm and low birthweight infant. *Clinical Perinatology*, 38, 605-625.

Rodrigues, L. P., Sraiva, L., & Gabbard, C. (2005). Development and construct validation of an inventory for assessing the home environment for motor development. *Research Quarterly for Exercise and Sport*, 76, 140-148.

Rosenberg, L., Jarus, T., Bart, O., & Ratzon, N. Z. (2011). Can personal and environmental factors explain dimensions of child participation? *Child: Care, and Health Development,* 37, 266-275.

Rutherford, M. D., & Rogers, S. J. (2003). Cognitive underpinnings of pretend play in autism. *Journal of Autism and Developmental Disabilities*, 33, 289-302.

Rutherford, M. D., Young, G. S., Hepburn, S., & Rogers, S. J. (2007). A longitudinal study of pretend play in autism. *Journal of Autism and Developmental Disorders,* 37, 1024-1039.

Shepherd, R. B. (Ed.). (2014). *Cerebral palsy in infancy: Targeted activity to optimize early growth and development.* London: Elsevier.

Shimada, S. (1990). Relationship between pretend play and expressive language in

Down syndrome young children. RIEEC Report, 26, 55-63.

Shonkoff, J. P., & Phillips, D. A., (Eds.), (2000). *From neurons to neighborhoods: The science of early childhood development*. Washington, DC: National Academy Press.

Smilansky, S. (1968). *The effects of sociodramatic play on disadvantaged preschool children*. New York, NY: Wiley.

Smith, P. K. (2010). *Children and play.* Malden, MA: Wiley-Blackwell.

Son, S-H., & Morrison, F. J. (2010). The nature and impact of changes in home learning environment on development of language and academic skills in preschool children. *Developmental Psychology,* 46, 1103-1118.

Stagnitti, K. & Unsworth, C. (2000). The importance of pretend play in child development: An occupational therapy perspective. *British Journal of Occupational Therapy,* 63(3), 121-127.

Sutter, L. E., & Miller, H. P. (1973). Income differences between men and women. *American Journal of Sociology*, 78, 200-212.

Tamis-LeMonda, C. S., Bornstein, M. H., & Baumwell, L. (2001). Maternal responsiveness and children's achievement of language milestones. *Child Development,* 72, 748-767.

Totskia, V., & Sylva K. (2004). The home observation for measurement of the environment revisited. *Child and Adolescent Mental Health,* 9, 25-35.

Venetsanou, F., & Kambas, A. (2010). Environmental factors affecting preschoolers' motor development. *Early Childhood Education Journal,* 37, 319-327.

Vieillevoye, S., & Nader-Grosbois, N. (2008). Self-regulation during pretend play in children with intellectual disability and in normally developing children. *Research in Developmental Disabilities,* 29, 256-272.

Vygotsky, L. S. (1967). Play and its role in the mental development of the child. *Soviet Psychology,* 5, 6-18.

Walker, S. P., Wachs, T. D., Grantham-McGregor, S., Black, M. M., Nelson, C. S., Huffman, S. L., . . . Richter, L. (2011). Inequality in early childhood: Risk and protective factors for early child development. *Lancet*, 378, 1325-1338.

Wang, L. W., Wang, S-T., & Huang, C. C. (2008). Preterm infants of educated mothers have better outcomes. *Acta Pediatrica,* 97, 568-573.

Warren, S. F., & Brady, N. C. (2007). The role of maternal responsivity in the development of children with intellectual disabilities. *Mental Retardation and Developmental Disabilities Research Reviews*, 13, 330-338.

Whitebread, D., Coltman, P., Jameson, H., & Lander, R. (2009). Play, cognition and self-regulation: What exactly are children learning when they learn through play? *Education and Child Psychology,* 26, 40-52.

Wright, I., Lewis, V., & Collis, G. M. (2006). Imitation and representational development in young children with Down syndrome. *British Journal of Developmental Psychology*, 24, 429-450.

World Health Organization. (2007). *International classification of functioning, disability and health- Child and youth version*. Geneva, Switzerland: World Health Organization.

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Publications

Martin, S., & Kessler, M. (2012). *Neurologic Interventions for Physical Therapy*, Polish language edition. Elsevier Urban & Partner, Worclaw; translation by Edward Saulicz.

Cech, D., Martin, S. (2012). *Functional Movement Development Across the Life Span*, 3rd ed. St Louis: Elsevier.

Martin, S., Kessler, M. (2011). *Neurologic Interventions for Physical Therapy*, Korean language edition. Elsevier Korea LLC.

Martin, S., Kessler, M. (2007). *Neurologic Interventions for Physical Therapy*, 2nd ed. St.Louis: Saunders/Elsevier.

Martin, T. (1994).When words speak louder than actions, PT Magazine of Physical Therapy, 2(10), 96.

Martin, T. (Ed) (1993). Pediatric Physical Therapy Education, Special Issue *Pediatric Physical Therapy.* 1993:5(3).

Martin, T., Vandeveer, M., Del Rio, M. (1992). Family interaction and developmental outcome in children who required intensive care at birth. *Pediatric Physical Therapy,* 4(2), 78-84.

Martin, T. (1990) Risk + Change = Growth. *Pediatric Physical Therapy,* 2(1), 23-24.

Martin, T. (1989). Normal Development of Movement and Function through the Life

Cycle. In Barnes ML, Scully R. (Ed): *Physical Therapy*, Philadelphia: Lippincott, 63-82.

Martin, T. (1989). Access and Advocacy. *Pediatric Physical Therapy,* 1(4), 173-174.

Martin, T. (1989). Facing the Future. *Pediatric Physical Therapy,* 1(3), 121-122.

Martin, T. (1989). Springing into Action. *Pediatric Physical Therapy,* 1(2), 65-66.

Martin, T. (1989). Testimony for the Youth Fitness Hearings of the President's Council on Physical Fitness of Children and Youth. *Pediatric Physical Therapy,* 1(1), 17-18.

Martin, T. (1989). New Beginnings. *Pediatric Physical Therapy,* 1(1), 15-16.

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